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COMMERCIAL–IN-CONFIDENCE

United Vision Solutions, Co.

# HomeLand Security Products & Solutions

# Eagle Vision EV3000-D IR

Dual camera system for 24/7 surveillance

Stainless Steel 316L enclosure and Pan/Tilt

tedvis

EXPLOSION PROOF Exd IIC T5

**Forget rust and salt air corrosion**

United Vision Solutions, Co.
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## *System Highlights*

### Thermal Imager Tri-FOV

- 7.5-13.5µ Uncooled
- 320x240 VOx
- 2X Electronic Zoom
- 100 mm lenses

### *Pan/Tilt resolution*

High performance, brushless, maintenance-free step motors provide very precise, extremely effective motion control with preset and 0-360 degree endless rotation

### *CCTV software with TCP/IP*

– Full control of Thermal / Day-Night / Pan/Tilt
– Using standard Protocol Pelco-D
- SDK software librarym for developing Control Softwware locally

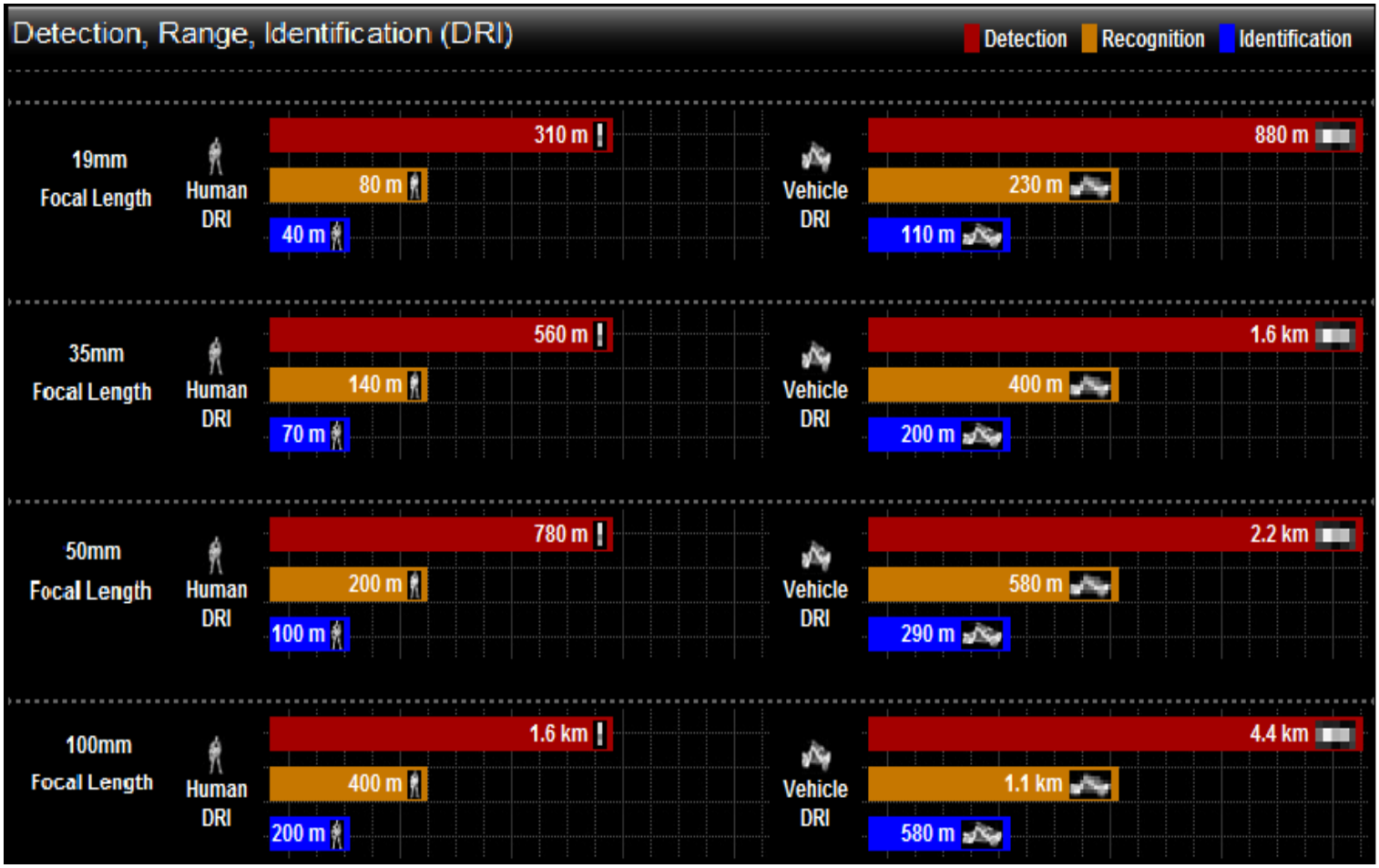
### *Day/Night Camera*

– 1/2” High-Resolution EMCCD
– 0.00025 Lux Minimum Illumination
– Lens 10-300mm
– Reproduces full colour, full motion images in starlight conditions

### *Sensor Platform*

– Heavy Duty, Stabilized Pan/Tilt
– Stainless Steel Enclosure,
- Explosive-proof

This product can be used where the explosive gas can be produced such as petroleum refining factory, Petro chemistry, Chemical Synthesis Plant and Power plant and it is apt to be corroded in salt such as shore or ship due to its material Stainless Steel 316 against corrosion.



## *Unique Features*

# *Automatic Target Tracking*

*The Automatic Track system is an intelligent controller that drives PTZ cameras to track automatically objects in motion and zoom on them, without manual intervention and without an operator.*
*In a context of standalone recording for security purposes, video sequences captured in tracking mode have much more chances to capture detailed, useful images of significant events.*
*The Automatic Track system enables to fully exploit the possibilities of a PTZ camera, without an operator.*

## *System Features*

Forming part of the “Eagle Vision Camera” EVST series of fully stainless steel camera housig, and PT units, the EVST stainless steel range has been designed to offer an extremely reliable, robust and high quality surveillance solution for security applications that demand the very best performance, regardless of the installed environment. Precision engineered to exacting standards, the range o ers numerous benefits over the use of long range lenses and PTZ cameras with a range of options available to ensure a best-fit solution is achieved.

- *Fastest long-range lens available today .*
- *Most cost-effective format imager for clear, sharp image resolution*
- *Ethernet addressable, for complete flexibility to solve any security problem*
- *Simple GUI software allows for quick, foolproof changes to viewing parameters*
- *Universal mount capability: open software architecture is capable of supporting most Pan/Tilt controls*
- *Joystick Control with simple single hand motions*
- *Pre-sets: Simple entry GUI format for establishing up to 100 pre-set positions*
- *Tours: Up to 32 tours with 32 pre-sets per tour*
- *CCTV Control: Serial control of all peripheral • devices in one system*
- *IP controllability: Easy set up and operation via wired/wireless Ethernet control*
- *Visible Camera Control: Serial control of all peripheral devices in one system*

Thermal Imager and Day-Night camera

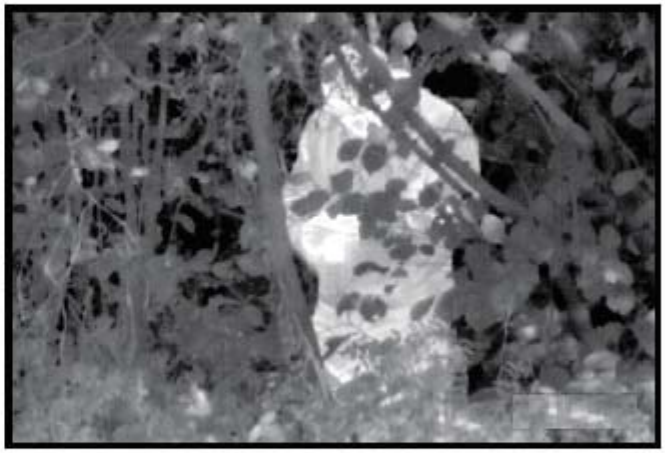
Reproduces full colour, full motion images in starlight conditions

## WHY THERMAL?

**Thermal security cameras let you see threats you never knew were there – day and night, in good weather and bad**

### You won't believe what you haven't been seeing

Today's Security Professional must detect and counter the threats arrayed against their valuable assets and personnel – thermal security cameras are the most effective tool for that job. Providing maximum image contrast, thermal cameras are the technology of choice for military security forces, made affordable for today's civilian security community



United Vision Solutions

UVS

Long Range Day Night Camera

CCTV Surveillance Systems

Detectors & Body Armor

## Day Camera Module

| | |
|---|---|
| Image sensor | 1/2" EMCCD night vision camera |
| Active P ixels | 658 x 496 P ixel |
| E ective Pixels | 319 k Pixel |
| Filter | Automatic mechanical IR cut filter |
| Resolution | Color : 560 TV Lines B/W : 700 TV Lines |
| shutter Speed | Manual (OF F, 1/60, 1/100, 1/250, 1/500, 1/1000, 1/2000) |
| Synchronisation | Internal / Line Lock |
| Min. Illumination | 0.000004 Lux |
| Signal/Noise ratio | 50 dB , |
| Back Light Compensation (BLC) | On/Off |
| White balance | ATW/One Push WB/MANUAL |
| Automatic Gain Control (AGC) | OF F, 0 dB to 18 dB (1 dB S tep S electable) |
| IRIS Control | DC / Video |

## optical zoom module

| | |
|---|---|
| Lens | Motorized lenses with focal 10-300mm |
| Zoom | motorized zoom 30X |
| Angle of view | from 43.6º (WIDE end) to 1.5º (TELE end) |
| Zoom/Focus/IRIS | Motorized Zoom, and Focus<br>Option Auto-Focus<br>Auto video IRIS |

## Thermal Camera Module

| | |
|---|---|
| IR detector/sensor | Long Life, Uncooled VOx Microbolometer |
| Picture elements | 320x240 |
| Lens | 100mm 7° x 5° |
| Spectral Range | 7.5 to 13.5 µm |
| Control Operation | AGC, Focus, FOV, On\Off, Video, Polarity, NUC, El Zoom |

## Electrical

| | |
|---|---|
| Input voltage | Choice from 115V AC, 230V AC, 24VA (DC for solar power) |
| Power consumption | 480 W max (two cameras system) |

## Connectivity

| | |
|---|---|
| Video | Co-axial via composite cable |
| Telemetry | Twisted pair. Simplex, half and full duplex operation via composite cable |
| Power | Via composite cable |

## Mechanical

| | |
|---|---|
| Drive unit | Integral pan/tilt motor drive |
| Pan angle | 0-350° (continuous rotation is option) |
| Pan speed | 0.1° to 50° per second |
| Tilt angle | -70° to +25° |
| Tilt speed | 0.1° to 25° per second |
| Speed control | Closed loop electronics |
| Preset accuracy | Better than 0.08° |
| FeedBack | Option |

## Physical

| | |
|---|---|
| Construction material | Grade 316 stainless steel |
| Viewing window | Tempered flat glass |
| Standard colours | Stainless steel (no colour options) |
| Standard finish | Stainless steel (no finish options) |
| Dimensions | Different Sizes Available |
| Weight | 200Kg |

## Environmental

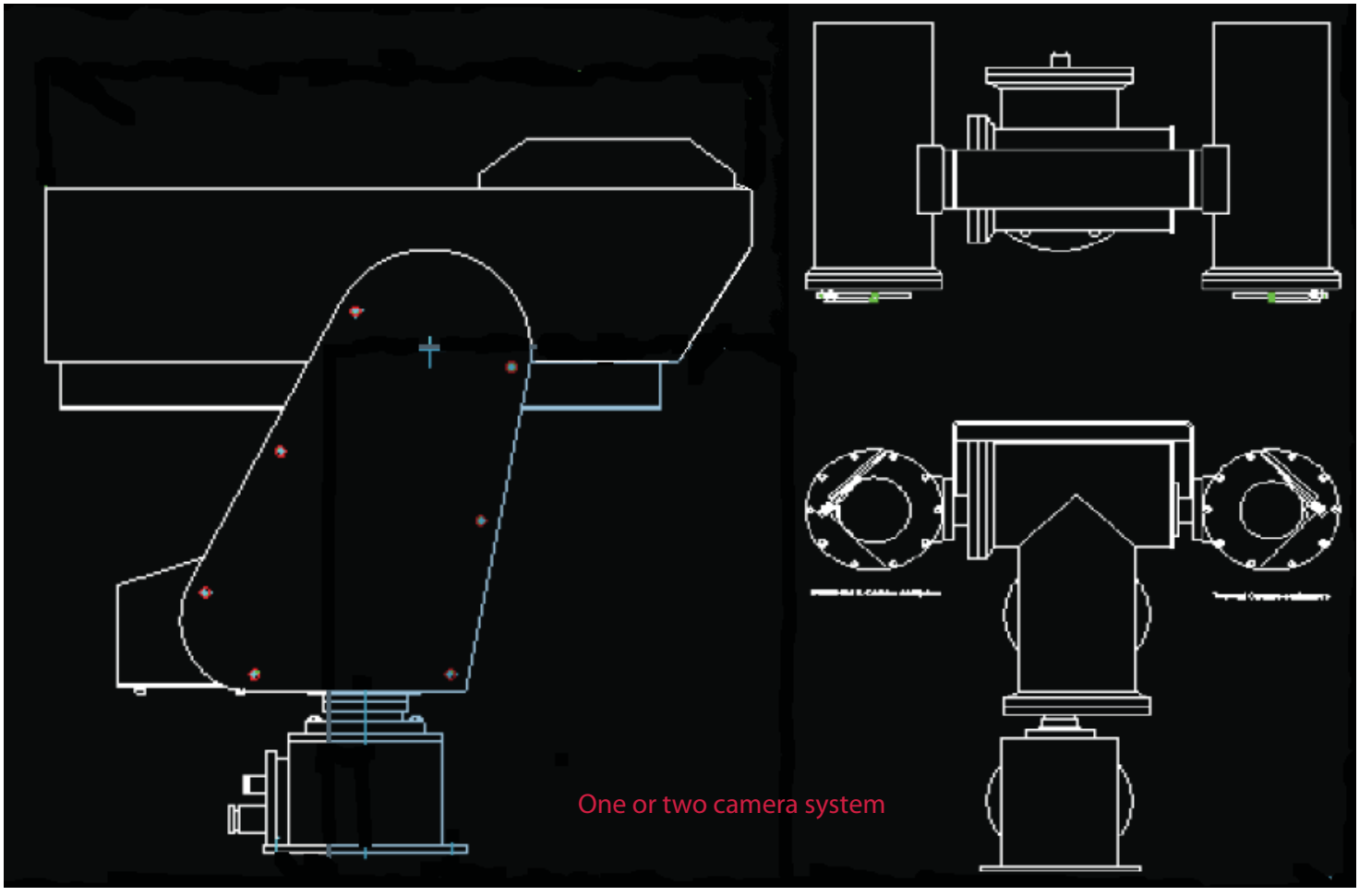
| | |
|---|---|
| Operational temperature | -25°C to +55°C (coated with solar paint) |
| Weather proofing | IP66 |
| Explosive-proof | Exd IIC T5 |

## Communication & Protocols

| | |
|---|---|
| Communication | RS485 / RS422 or TCP/IP |
| Control protocol | Pelco-D protocol |

## Available Options

| | |
|---|---|
| Camera module | IR camera cooled, uncooled, and day camera |
| Camera colour system | NTSC or PAL |
| Installed protocol | Pelco-D protocol |
| Telemetry control interface | RS422 or TCP/IP |
| Window wiper | Optional, factory fit |
| Washer | Optional, factory fit |
| Water tank | Optional, 10 ltrs or 25 ltrs |
| Heater | Optional, factory fit |
| Mounting | Custom kits for pole, tower, and side building |
| Cabling | Composite cable, UTP, or Fiber Optics |



One or two camera system

United Vision Solutions

Long Range Day Night Camera

CCTV Surveillance Systems

Detectors & Body Armor

# Eagle Vision Surveillance System

## Highlights

**Hi-Resolutions Color Camera at day time.**
**Thermal Imaging at dark and bad weather.**
**Stainless Steel Enclosure for ultimate protection.**
**Stainless Steel Pan/Tilt unit, with precise step rotation 0.1 degree.**
**Low power Consumption, perfect choice when solar power is required.**
**Long Range wireless using Hi-tech codec system.**
**Stander Pelco D-Protocol to integrate with any off-shelf CCTV products.**

Selection of the EV3000 series is the lowest risk choice for user required 24/7 surveillance system, EV's **mature design**, broadly accepted **performance advantages**, and UVS's **proven integration capability**. Eagle vision Systems offers a very low schedule risk based on current production capacity, inventory and vertical integration. Low life-cycle cost and logistical experience also make Eagle Vision the low-risk choice, with its commitment to a carefully implemented, long-term support program. UVS's unique vertical integration insures that we can provide critical replacement components and servicing faster and at lower prices than other suppliers who depend on third parties.

## TECHNICAL DATA

The EV3000-D IR model is a self-contained day and thermal imaging system, the EV-ST IR camera which detects radiation in the 7.5 to 13.5 µm infrared band. The EV-ST is capable of target discrimination and recognition in total darkness or through daylight obscurants and was designed for short- or long-term stationary surveillance applications. The EV3000-D IR model imager is contained in an environmentally sealed stainless steel enclosure permitting deployment in severe climatic and weather conditions. Its FOV (Field-of-View) lens and low power consumption is ideal for use in field operations. The EV3000's Hi-resolution color camera brings sharp, crispy images around the clock, combined with AC or DC power sources and remote control capability, makes it well suited for long-range surveillance applications requiring remote operation.

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Delivering outstanding imaging performance, advanced features of the EV3000-D IR model include:

- 320 x 240 Pixel Long Life, Uncooled VOx Microbolometer
- Digita l Detail Enhancement (DDE) for optimal image quality
- Ruggedized weatherproof Stainless Steel environmental enclosure
- High durability coated front lens
- Lens defroster
- 100mm lenses 7° FOV
- 2x digital zoom
- Internal NUC paddle
- Freeze frame
- Color or Monochrome video output
- Auto gain and level control

The EV3000-D IR model is UVS Systems' next generation imager benefiting from unique developments aimed at mproving signal processing and imaging performance. Using High Resolution Video Processor (HRVP) generates the EV3000-D IR model's high quality images and long-range performance.

This multi-layer PCB (printed circuit card) is a unique feature and provides the user with an advanced suite of capabilities including:

- Advanced digital signal processing with temporal noise filters
- True multi-mode sensitivity (user selectable for hot or cold scenes)
- Histogram equalization
- Digital zoom
- Color palettes
- Freeze frame

The EV3000-D IR model imager also includes easily accessible and automated image processing software that automatically adjusts contrast and brightness levels for the scenes being viewed, simplifying operation by the agent. For more specialized situations, operators can choose between different sensitivity levels in the IR imaging system depending on the environmental conditions that affect the thermal contrast of people and vehicles under observation.

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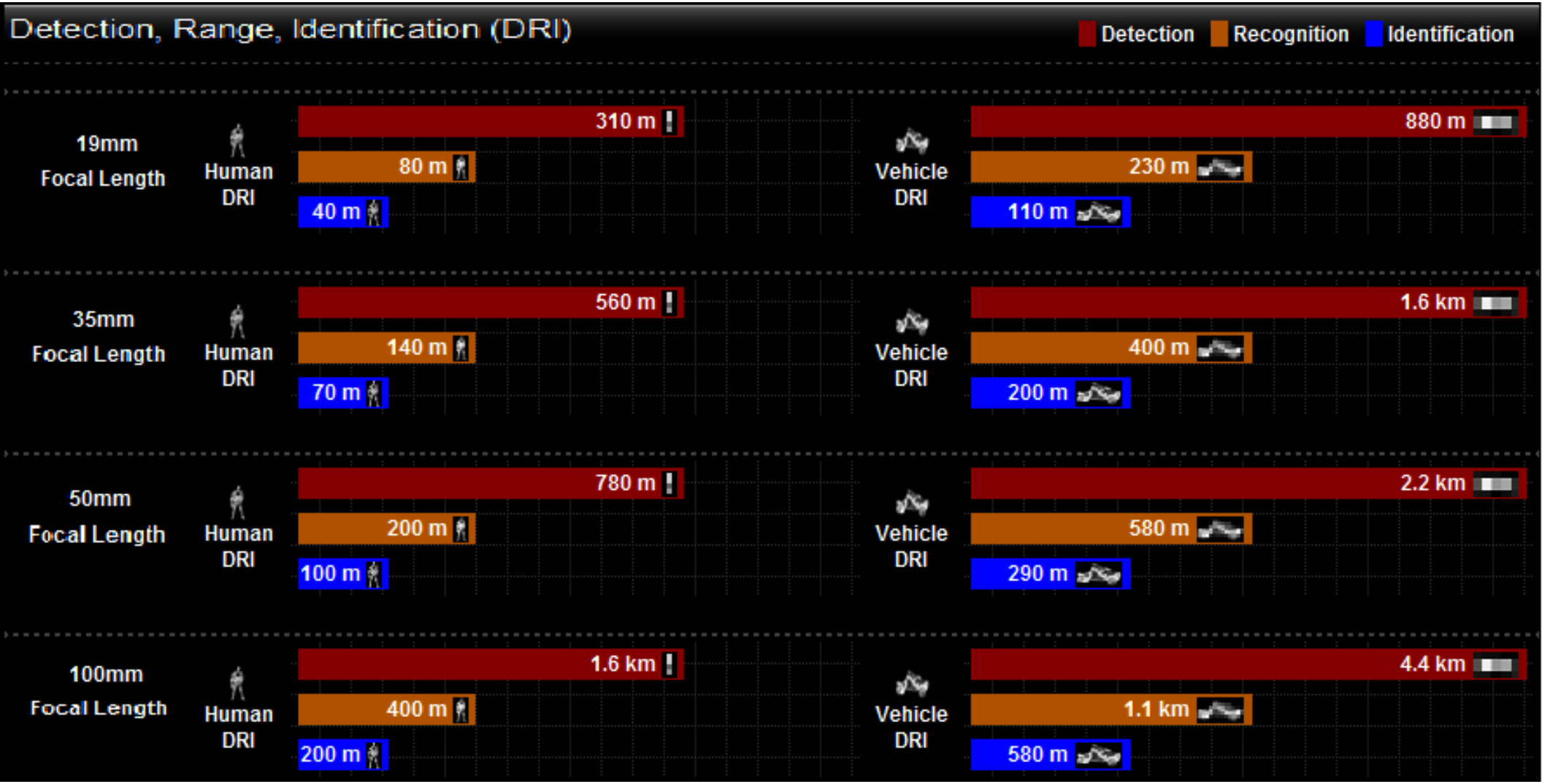
# Uncooled TI-7000 Thermal Camera

| Model | • 19mm Focal Length | • 35mm Focal Length | • 50mm Focal Length | • 100mm Focal Length |
|---|---|---|---|---|
| Detector Type | Long Life, Uncooled VOx Microbolometer | Long Life, Uncooled VOx Microbolometer | Long Life, Uncooled VOx Microbolometer | Long Life, Uncooled VOx Microbolometer |
| Effective Resolution | 320 x 240 | 320 x 240 | 320 x 240 | 320 x 240 |
| Pixel Pitch | 38um | 38um | 38um | 38um |
| Focal Length (mm) | 19mm | 35mm | 50mm | 100mm |
| Field of View in degrees | 36° x 27° | 20° x 15° | 14° x 10° | 7° x 5° |
| Zoom, Optical, Electronic | N/A | 2x E-Zoom | 2x E-Zoom | 2x E-Zoom |
| Spectral Range | 7.5 to 13.5 µm | 7.5 to 13.5 µm | 7.5 to 13.5 µm | 7.5 to 13.5 µm |
| Focus Range | N/A | 21 ft to ~ (fixed) | 30 ft to ~ (fixed) | 5 ft to ~ (fixed) |
| Detect Man Sized Target | 1500' | 2500' | 3500' | 1.34 Miles |
| Outputs | Composite Video NTSC/PAL | Composite Video NTSC/PAL | Composite Video NTSC/PAL | Composite Video NTSC/PAL |

## General Information

| | | | | |
|---|---|---|---|---|
| Point to Point (stand alone) | Standard | Standard | Standard | Standard |
| Software Developers Kit | Optional | Optional | Optional | Optional |
| Weight | < 7 lbs. | < 6 lbs. | < 6 lbs. | < 8lbs |
| Dimensions (L,W,H) | 25.4 d x 10.9 h cm (9.9 x 10.9 in) | 11" x 5.2" x 5.6" | 11" x 5.2" x 5.6" | 11" x 5.2" x 5.6" |
| Power Requirements | 12 Volts DC | 14-32 VDC or 24 VAC +/- 10% | 14-32 VDC or 24 VAC +/- 10% | 14-32 VDC or 24 VAC +/- 10% |
| Power Consumption | 2W Quiescent, 15 W (max) | 6W Nominal, 24W Peak, at 24 VDC | 6W Nominal, 24W Peak, at 24 VDC | 8W Nominal, 24W Peak, at 24 VDC |

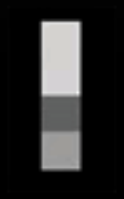

Detection, Range, Identification (DRI)
Detection
Recognition
Identification
19mm Focal Length
Human DRI
310 m
80 m
40 m
Vehicle DRI
880 m
230 m
110 m
35mm Focal Length
Human DRI
560 m
140 m
70 m
Vehicle DRI
1.6 km
400 m
200 m
50mm Focal Length
Human DRI
780 m
200 m
100 m
Vehicle DRI
2.2 km
580 m
290 m
100mm Focal Length
Human DRI
1.6 km
400 m
200 m
Vehicle DRI
4.4 km
1.1 km
580 m

## Human DRI

The Johnson Criteria assumes that the critical dimension for a human being is 0.75 meters. To get DRI, you need 1.5 pixels, 6 pixels and 12 pixels across 0.75 meters in the object pane. That means:

Detection = 1.5 pixels / 0.75m = 2 pixels per meter
Recognition = 6 pixels / 0.75m = 8 pixels per meter
Identification = 12 pixels / 0.75m = 16 pixels per meter

Assuming that a man is 1.83m by 0.5m, the following would apply:



Detection

3.6 pixels by 1 pixel
(You can see something is there)

Recognition

13 pixels by 5 pixels
(You can see that a person is there)

Identification

28.8 pixels by 8 pixels
(You can see that the person looks like a soldier)

Vehicle DRI

The Johnson Criteria assumes that the critical dimension for a human being is 0.75 meters. To get DRI, you need 1.5 pixels, 6 pixels and 12 pixels across 0.75 meters in the object pane. That means:

Detection = 1.5 pixels / 0.75m = 2 pixels per meter
Recognition = 6 pixels / 0.75m = 8 pixels per meter
Identification = 12 pixels / 0.75m = 16 pixels per meter

Assuming that a vehicle is 4m by 1.5m, the following would apply:

Detection
2.8 pixels by 1 pixel
(You can see something is there)

Recognition
13 pixels by 5 pixels
(You can see that a vehicle is there)

Identification
26 pixels by 10 pixels
(You can see that the vehicle may be a humvee)

## Inflatable Boat DRI

The Johnson Criteria assumes that the critical dimension for a human being is 0.75 meters. To get DRI, you need 1.5 pixels, 6 pixels and 12 pixels across 0.75 meters in the object pane. That means:

Detection = 1.5 pixels / 0.75m = 2 pixels per meter
Recognition = 6 pixels / 0.75m = 8 pixels per meter
Identification = 12 pixels / 0.75m = 16 pixels per meter

Assuming that a inflatable boat is 9m by 1m, the following would apply:

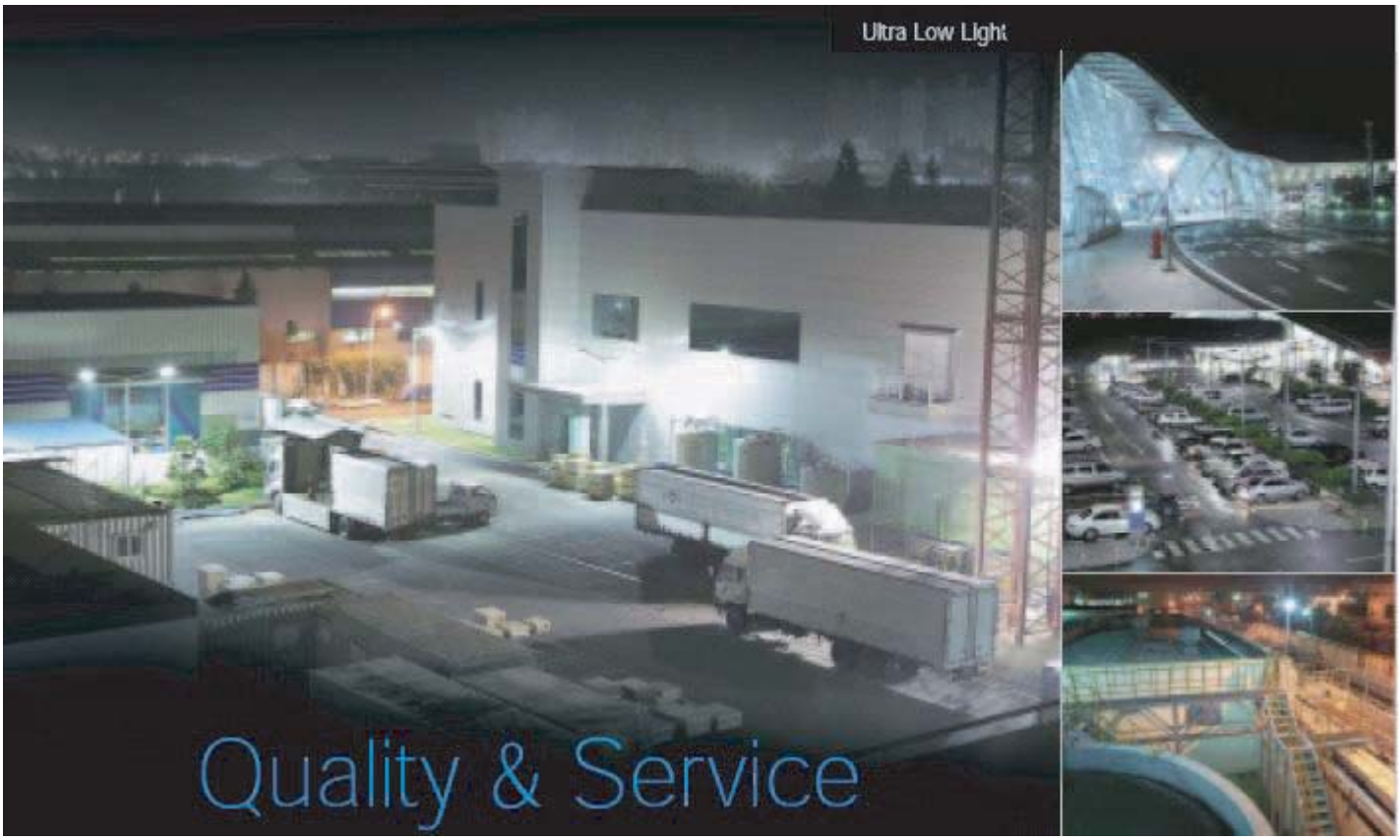
Detection
4.5 pixels by 1 pixel
(You can see something is there)

Recognition
18 pixels by 2 pixels
(You can see that a boat of some kind is there)

Identification
36 pixels by 4 pixels
(You can see that the boat is a small Inflatable Boat)

# Day/Night CCTV Camera System

EXTREME LOW LIGHT COLOUR VIDEO CAMERA




*Achieves sensitivity and dynamic range in excess of current generation night-vision cameras and provides full colour at 30 FPS in near total darkness!*

| FEATURE | BENEFIT |
|---|---|
| 0.00025 Lux Minimum Illumination | Reproduces full colour, full motion images in starlight conditions |
| 50 dB S/N Ratio | Provides industry leading sharpness in ALL light conditions |
| Electron Multiplying CCD (EMCCD) | Generates new electrons dramatically increasing sensitivity at very fast speeds without the common readout noise of traditional CCD |
| Adaptive Recursive Noise Reduction | Reduces CCD output buffer noise in low light conditions |
| Peltier Cooled CCD | Maintains constant temperature of CCD to maximize low light performance |

# EXTREME LOW LIGHT COLOUR VIDEO CAMERA

| | |
|---|---|
| Image Sensor | 1/2 inch CCD |
| Active Pixels | 658 x 496 Pixel |
| E ective Picture Element | 319 k Pixel |
| Video Output Signal | VBS (NTSC:BNC), Y/C |
| Lens Mount | C Mount (Lens Not Included With Camera) |
| SYNC System | Internal |
| Resolution | 420 TVL (NTSC OUT) |
| Minimum Illumination | 0.001 Lux (F1.2 CMG x 1000, AGC 12 dB, White 50%)<br>0.00025 Lux (F1.2 CMG x 1000, AGC 12 dB, White 10%)<br>0.000004 Lux (256 x long term exposure*, AGC O , White 10%) |
| S/N Ratio (NTSC) | 50 dB |
| White Balance | ATW/One Push WB/MANUAL |
| IRIS Control | Auto Iris Lens (EE/DC) |
| Electric Shutter | Manual (OFF, 1/60, 1/100, 1/250, 1/500, 1/1000, 1/2000) |
| GAIN | OFF, 0 dB to 18 dB (1 dB Step Selectable) |
| Charge Multiplication GAIN (CMG) | x 1000 approximately (maximum) |
| Backlight Compensation | 7-Mode Selectable, 16 Area Photometry |
| Frame Rate | 30 Frames Per Second |
| Camera Control | RS-232C (Dsub-9p) |
| Power Supply | 12 V DC |
| Power Consumption | At 77 °F: 6 watts, At 104 °F: 12 watts |
| Operating Temperature | 14 °F to 113 °F |
| Humidity | 90% Maximum |
| Weight | 15.8 oz (450 g) |
| Dimensions | 2.28" (W) x 2.3" (H) x 5.24" (D) |
| Emission Standard | FCC Class A |
| Warranty | One Year Limited Warranty |

**Slow Shutter*

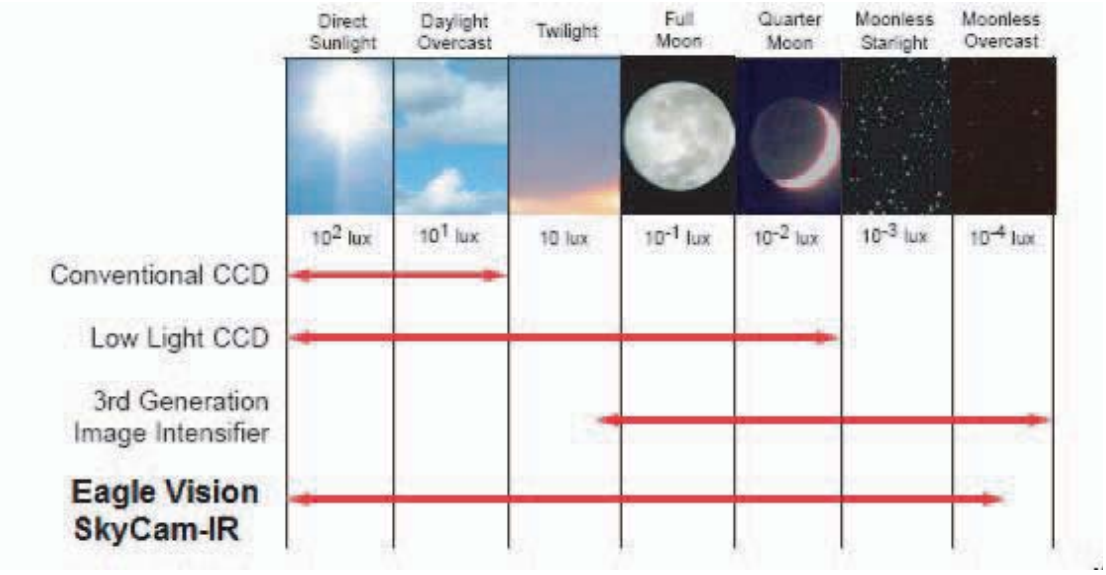
## APPLICATIONS

Suggested applications for the camera:

- Military
- Bio Science
- Scienti c
- Non-Destructive Testing
- Extreme Low Light Underwater Video
- Realism Broadcast TV
- Mine & Safety Inspection

## WHAT IS EMCCD?

Electronic multiplying architecture di ers from traditional CCD technology in that a gain register is inserted between the end of the shift register and the output amplier. The gain register has two phases with independent electrodes, each holding a di erent voltage potential. The resultant intense electric eld causes the electrons to undergo impact ionization. This generates new electrons that manifest themselves as dramatically increased sensitivity at very fast speeds without the common readout noise of traditional CCDs. **The result is virtually noiseless 30 FPS full color in near total darkness** .



# CCTV LENSES DAY & NIGHT
# 30x Motorized Zoom
# 10-300mm

**SPECIFICATIONS**

| | |
|---|---|
| FORMAT | 1/2″ |
| MOUNT | C |
| FOCAL LENGTH | 10 – 300mm |
| IRIS RANGE | F2.8 – 360 |
| ANGLE OF VIEW (1/2″)<br>(D x H x V) | 43.6°x35.5°x27.0° (WIDE)<br>1.5° x 1.2° x 0.9° (TELE) |
| M.O.D. | 3.0 M |
| BACK FOCAL LENGTH | 37.87 mm |
| FLANGE BACK LENGTH | 17.526 mm |
| FILTER SCREW SIZE | M82 P = 0.75 |
| DIMENSIONS | 105.0(W) x 92.0(H) x 210.0(L)mm |
| WEIGHT | APPROX 1850 g |
| OPERATION<br><IRIS> MOTORIZED<br><br><br><br><ZOOM> MOTORIZED<br><br><br><br><FOCUS> MOTORIZED | <br>CONTROL VOLTAGE:<br>DC6–12V,MAX40mA(6V)<br>MOTORIZATION SPEED:<br>APPROX 6.0sec.(6V)<br>CONTROL VOLTAGE:<br>DC6–12V,MAX50mA(6V)<br>MOTORIZATION SPEED:<br>APPROX 6.5sec.(6V)<br>CONTROL VOLTAGE:<br>DC6–12V,MAX50mA(6V)<br>MOTORIZATION SPEED:<br>APPROX 13.0sec.(6V) |
| OPERATING TEMPERATURE | –10 – +50°C |

# Long Range Dual Camera System

# Eagle Vision

## USER'S MANUAL

## EV3000-D

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# Important Notice

**The manual is organized into two main sections, section A describes the system components, system installation, and section B describes system operation.**

## EXPORT CONTROL

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United Vision solutions, Co. warrants its products to be free from defects in materials and workmanship for 365 days from the date of shipment to the customer. Other items such as accessories purchased for resale with minor modifications may carry a shorter warranty. During the warranty period, United Vision solutions, Co will, at its option, either repair or replace any products found to be defective.

This warranty will not apply to defects resulting from misuse, repair by unauthorized persons, or where the product is not installed and used in accordance with the instructions provided by United Vision solutions, Co. This warranty is void if the product has been altered or modified in any manner by unauthorized persons.

Under the limited warranty, the customer is responsible for the shipping and any other charges incurred in sending the product to the authorized service center specified by United Vision Solutions, Co.; and United Vision Solutions, Co. will pay for the return of the product to the customer. The turnaround time on repairs will normally be ten working days or less.
All warranty repairs must be performed at an authorized United Vision Solutions, Co. service center using recommended replacement spare parts. No other warranty, expressed or implied, other than those specifically stated above are the responsibility of United Vision Solutions, Co. In no event shall United Vision Solutions, Co. be held responsible for incidental or consequential damages.

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## Safety Summary

This manual describes processes that may cause in ury or death to personnel, or damage to equipment if not properly followed. This safety summary includes general safety precautions and instructions that must be understood and applied during operation and maintenance to ensure personnel safety and protection of equipment. Prior to performing any tas , the s, C T s and TEs included in that tas shall be reviewed and understood.

### WARNINGS, CAUTIONS, NOTES

**WARNING**

sed to indicate a location, equipment or system where a potential ha ard exists capable of producing in ury to personnel if approved procedure is not followed.

**CAUTION**

sed to indicate an operating or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in damage to or destruction of equipment or loss of mission effectiveness or long term health ha ards to personnel.

**NOTE: Used to indicate an essential operating or maintenance procedure, condition, or statement.**

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## Section A

# Installation's Manual

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**4. EV3000-D Drawing**

**5. EV3000-D wiring**

**6. EV3000-D Enclosure Wiring**

**7. EV3000-D Protocol & Control command list**

**8. EV3000-D Address & Baud rate Setting**

**9. Warranty**

**10. Appendix**

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# 1. Introduction

The EV3000-D is an Explosion Proof Type Pan Tilt Driver & Camera System with two Cameras and Camera Control Unit.

The 1st camera is infrared (IR) camera intended for use during dark or night time, as a long range thermal imaging surveillance system and the other is Day/Night camera plus zoom lens.

This product can be used where the explosive gas can be produced such as petroleum refining factory, Petro chemistry, Chemical Synthesis Plant and Power plant and it is apt to be corroded in salt such as shore or ship due to its material Stainless Steel 316 against corrosion.

And this product is used in border surveillance for military, police, emergency services incorporating thermal imager.

The remote-control unit can rotate this product vertically or horizontally through the built-in receiver.

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# 2. Specifications

## A- Thermal Camera

### Camera Performance

| | |
|---|---|
| Sensor Type | 320x240 VOx Uncooled Microbolometer |
| Spectral Range | 7.5-13.5µ |
| Lens Focal Length | 100mm |
| Field-of-View | 7° x 5° |
| Electronic Zoom | 2X |
| Image Processing | AGC & DDE |
| Video Output | NTSC & PAL |

### SYSTEM SPECIFICATIONS

#### Power

| | |
|---|---|
| Requirement | 14-32VDC or 24VAC ±10% |
| Consumption | 8W nominal, 36W peak, |

#### Environmental

| | |
|---|---|
| Operating Temp. | -26° to +131°F (-32° to +55°C) |
| Storage Temp. | -58° to +185°F (-50° to +85°C) |
| Qualification Standard | MIL-Std 810F |

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**B- DLTV camera (day light CCD camera)**

Eagle Vision Surveillance that Never Sleeps

# EV-EMCCD

Eagle Vision Surveillance Camera Sysytem that Never Sleeps

With its built-in night vision Electron Multiplying CCD the Eagle Vision has a light sensitivity that is more than 100 times better than average. The fact that this camera has been selected as the solution for the unmanned surveillance needs of military front lines proves its capability.

The Eagle Vision can detect and distinguish a moving subject from over 400m (approx. 440yds) away in a pitch-dark environment, and send the image to a military command center for immediate response.

PECIFICATIONS

# Power Source : 12V DC (±10%)
# Power Consumption: Max. 1.2A
# Total Pixels: 680(H) x 500(V)
# Effective Pixels: 658(H) x 496(V)
# Scanning System : 2 : 1 Interlace ~ 525 Lines / 60 Fields / 30 Frames
# Synchronization: Internal / Line lock selectable
# Scanning Frequency: Horizontal : 15,734KHz / Vertical : 59.94H
# Resolution: Color : 450TV lines (Min.) / B/W : 470TV lines (Min.)
# Video Output: 1.0Vp-p / 75?(Video 0.714Vp-p, Sync 0.286Vp-p)
# S / N Ratio (Y signal): 50dB (AGC off, Weight on)
# Min. Illumination : 0.008Lux @ F1.2 (Normal color mode) 0.0005Lux @ F1.2
(B/W mode) 0.00006Lux @ F1.2 (Sens-up mode)
# Back Light Compensation : Low / Middle / High / Off selectable
# Day & Night : Color / B/W / Auto selectable (ICR filter change) /
EXT (External Day & Night mode control capability via terminal at the back panel)
# Gain Control : Low / High / Off selectable
# White Balance : ATW / AWC / Manual selectable (1800°K ~ 10,500°K)
# Electronic shutter speed : A.FLK / Manual (1/60, 1/120, 1/250, 1/500, 1/1,000, 1/1,600, 1/2,000sec)
# Sens-Up : On / Off (Selectable limit ~ 128X)
# O.S.D :Built-in
# Motion Detection : On / Off selectable (Built-in alarm output connector)
# SSNR : Low / Middle / High / Off selectable
# Privacy Function : On / Off selectable (4 Programmable zone)
# Communication : RS-485
# Iris Control : DC / Video
# Lens Mount : CS-mount (Easy focus type) (C-mount is mountable by using adaptor)
# Operating Temperature : -10°C ~ +60°C
# Operating Humidity : 20 ~ 90% RH
# Dimension : 375(W) x 565(H) x 628(L)mm
# Weight :30kg

| | |
|---|---|
| **Electrical** | |
| **Power Source** | 100 to 240 VAC 50-60 Hz |
| **On from Standby** | 3 seconds |
| **External Supply** | 12 Vdc, 3 Amps |
| **Physical** | |
| **Weight, Imaging Head** | 22 lbs (10 kg) |
| **Dimensions (nominal)** | L x Diameter |
| **Inches** | 22 x 9 |
| **Cm** | 56 x 13.5 |
| **Operating Temp** | -32°C to +55°C |
| **Storage Temp** | -46°C to +71°C |
| **Environmental** | Fully ruggedized per MIL-STD 810E |
| **Tripod Mountable** | Yes |

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# C- Pan/Tilt and Enclosure

| | |
|---|---|
| **Materials** | Stainless steel 316L |
| **Enclosure** | Pressurized rugged fill with Dry Nitrogen which prevents condensation inside the tube |
| **Wiper** | 24 VAC wipers, one for each enclosure |
| **Washer** | Pump with 10 ltr water tank |
| **Rotating angle** | Pan 0°to 360°/ Tilt -90°to +90°±5° |
| **Rotating speed** | Pan :0.1°~ 6°/sec, Tilt :0.1°~ 3°/sec Max |
| **Motor** | Step motor (DC 24V/6A, Pan 96W / Tilt 96W) |
| **Power Supply** | AC 110 / 220 VAC |
| **Temperature** | -25 to +50 |
| **Weight** | About 70 kg |
| **Preset** | 000~127(128 Presets) |
| **Interface** | RS-422 |
| **Receiver address** | 000~254(255 Addresses) |
| **Baud rate** | Selectable by DIP switch among 2400,4800, &9600 BPS<br>[Default : 2400BPS] |
| **Protocol** | PELCO-D (8 Data,1 stop, No parity) |
| **Camera & Lens Control** | 1)Thermal camera : Controlled by RS-422<br>2)Day/night camera : Zoom-in/out, Focus-near/far |
| **AUX Control** | 1)Two wipers<br>(Thermal camera and Day/night camera side)<br>2)One Pump |
| **Video** | 1)Thermal camera : BNC & SVIDEO (4Pin din connector)<br>2)Day/night camera : BNC |

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## 3. EV3000-D installation Notes

| | |
|---|---|
| | Before operation the unit, you must read this user's Manual thoroughly and retain it for future reference. |
| | Before cleaning the unit, you must remove it from the wall or bracket. You must clean it with a wet cloth. Never use liquid cleanser. |
| | Enough space must be ensured to installation of this P/T and never rotate PAN/TILT housing forcibly without driving by remote controller. |
| | Be careful not to put this unit on an unstable stand, tripod, shelf, or Table. |
| | Do not leave the unit in a location near heat sources or humidifier. |
| | Be careful of electric overload on the electric terminal or extension cable, otherwise there can be risk of permanent damage. |
| | You must stop operation this unit and never connect the connector of the cable to the unit in case of the following situations.<br>● In case of the control cable being damaged.<br>● When any liquid or unfavorable materials fall into the unit.<br>● When the unit doesn't work properly according to the instruction.<br>● When the unit fell down or the P/T was damaged. |
| | You must make an expert examine the accessories whether they have the same specific character when you need replacement of them. |
| | You must install AC24V power source near the EV3000-D (within 10m) Otherwise The EV3000-D will probably malfunction due to AC voltage drop or critical noise etc. |

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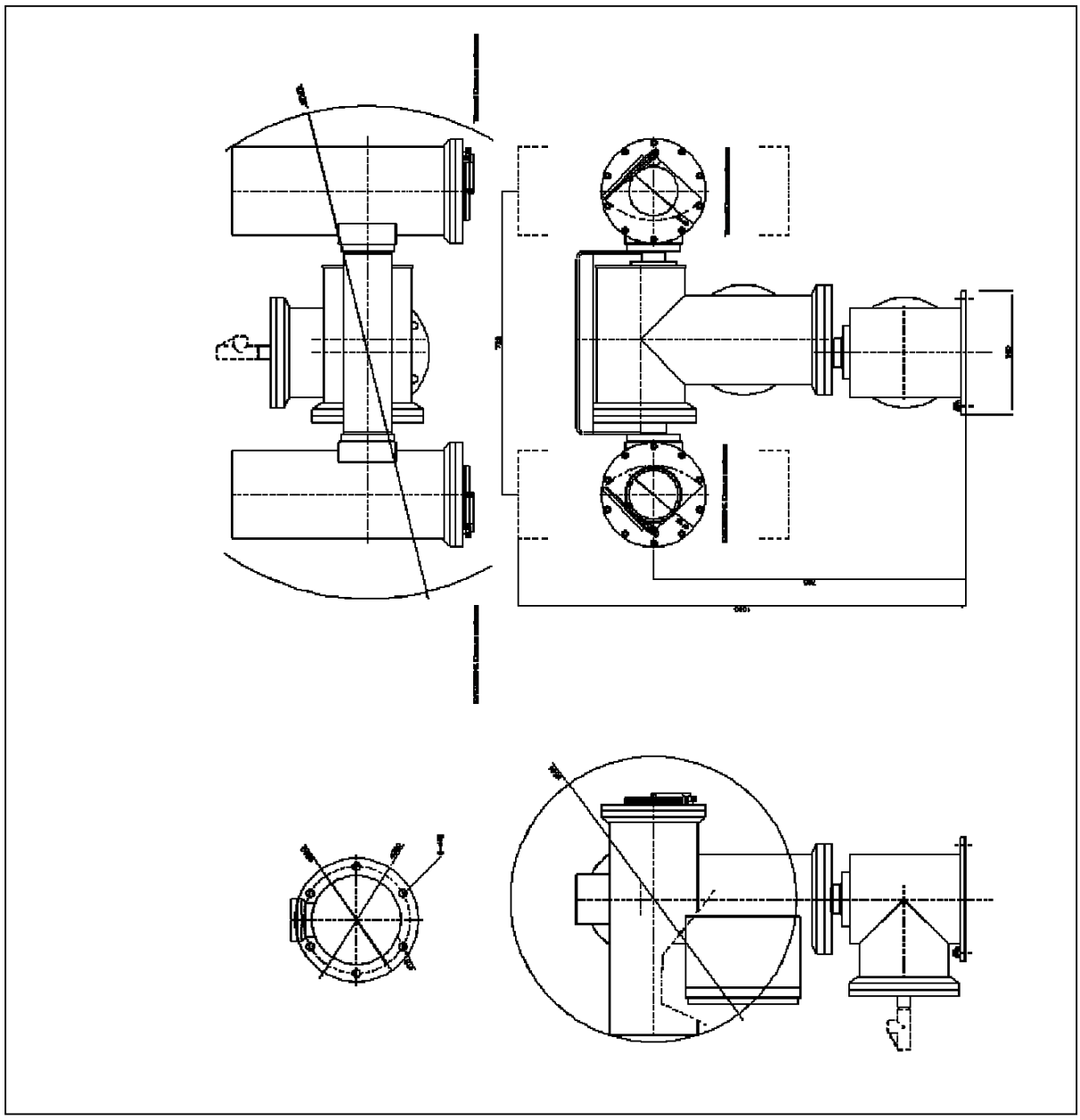
## 4. EV3000-D Drawing



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# 5. EV3000-D Wiring:

1) AC 24V Power Connection Terminals (Use AWG16 or 18 Wire)

-AC24V POWER -AC24V COM

2) Earth Terminal

-CONNECT EARTH LINE TO ⏚ **Terminal**

2) Thermal camera Video Connection Terminals

-THERMAL VIDEO (BNC)

-THERMAL SVIDEO (4-PIN DIN CONNECTOR)

3) Day/night camera Video Connection Terminal

-DAY/NIGHT VIDEO (BNC)

4) RS422 Data Communication line Connection Terminals

-TX+ (FROM EV3000-D TO OUTSIDE CONTROLLER or PC)

-TX- (FROM EV3000-D TO OUTSIDE CONTROLLER or PC)

-RX+ (FROM OUTSIDE CONTROLLER or PC TO EV3000-D)

-RX- (FROM OUTSIDE CONTROLLER or PC TO EV3000-D

-SHIELD: NO CONNECTION or CONNECT SHIELD WIRE OF OUTSIDE RS-422 DATA COMMUNICATION LINES

5) Pump Connection Terminals: Connect to DC24V+, DC24V- Terminals

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# 6. EV3000-D Enclosure Wiring

## 6-1.Thermal camera connection at thermal camera terminal

| TERMINAL No. | SIGNAL NAME | FUNCTION | PIN NAME |
|---|---|---|---|
| 1 | GND_IR | 12V DC SUPPLY RETURN FOR IR CAMERA | a |
| 2 | GND_IR | 12V DC SUPPLY RETURN FOR IR CAMERA | e |
| 3 | GND_IR | 12V DC SUPPLY RETURN FOR IR CAMERA | s |
| 4 | GND_IR | 12V DC SUPPLY RETURN FOR IR CAMERA | t |
| 5 | VDC+_IR | 12V DC FOR IR CAMERA\ | M |
| 6 | VDC+_IR | 12V DC FOR IR CAMERA | N |
| 7 | VDC+_IR | 12V DC FOR IR CAMERA | h |
| 8 | VDC+_IR | 12V DC FOR IR CAMERA | i |
| 9 | NONE | NONE | |
| 10 | RS422EN | RS-422 ENABLE | p |
| 11 | GNDD | GROUND REFERENCE FOR THE SERIAL COMM. LINES | A |
| 12 | GND_SHASSIS | CHASSIS GROUND | K |
| 13 | RXD1_422+ | RS-422 RECEIVE+(FROM 804D TO CAMERA) | n |
| 14 | RXD1_422- | RS-422 RECEIVE-( FROM 804D TO CAMERA) | T |
| 15 | TXD1_422+ | RS-422 TRANSMIT+(FROM CAMERA TO 804D) | B |
| 16 | TXD1_422- | RS-422 TRANSMIT-(FROM CAMERA TO 804D) | W |
| 17 | NONE | NONE | |
| 18 | NONE | S-VIDEO SHIELD WIRE(Not used) | |
| 19 | SVIDEO_GND | S-VIDEO LUMINANCE GND | u |
| 20 | SVIDEO_GND | S-VIDEO CHROMINANCE GND | H |
| 21 | SVIDEO_Y | S-VIDEO LUMINANCE | v |
| 22 | SVIDEO_C | S-VIDEO CHROMINANCE | J |
| 23 | RS170GND | COMPOSITE VIDEO GND | F |
| 24 | CVIDEO_1 | COMPOSITE VIDEO | b |
| 25 | GND_DF | GROUND RETURN FOR DEFROSTER | C |
| 26 | GND_DF | GROUND RETURN FOR DEFROSTER | X |
| 27 | GND_DF | GROUND RETURN FOR DEFROSTER | m |
| 28 | GND_DF | GROUND RETURN FOR DEFROSTER | q |
| 29 | GND_DF | GROUND RETURN FOR DEFROSTER | CC |
| 30 | GND_DF | GROUND RETURN FOR DEFROSTER | DD |
| 31 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | S |
| 32 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | k |
| 33 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | AA |
| 34 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | BB |
| 35 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | FF |
| 36 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | HH |

Please connect lead wires from thermal camera correctly to these terminals.

Otherwise,Electronic devices in EV3000-D receiver may be damaged.

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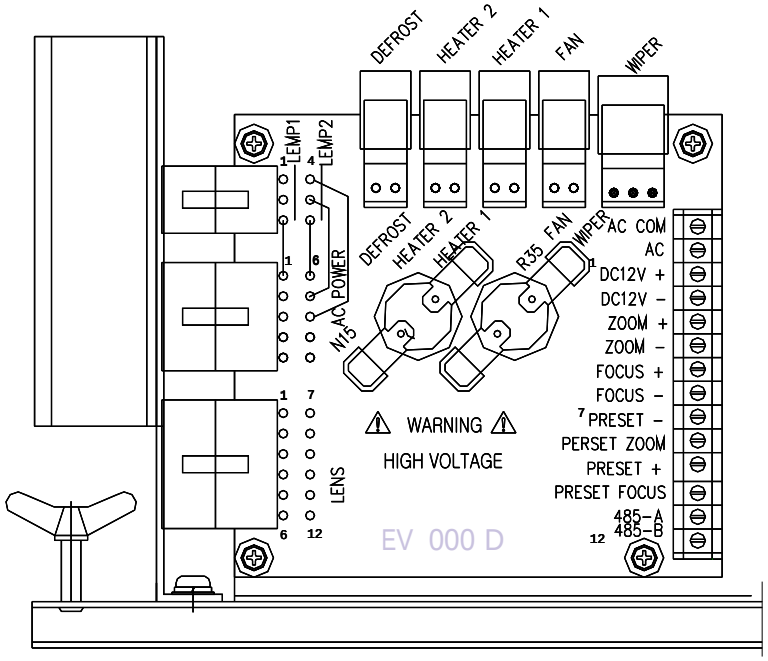
## 6-2 Day/night camera connection at Day/night camera terminal

| SIGNAL NAME | FUNCTION |
|---|---|
| DC 12V + | DC 12V CAMERA POWER |
| DC 12V - | DC 12V CAMERA POWER RETURN |
| ZOOM+ | ZOOM MOTOR+ |
| ZOOM- | ZOOM MOTOR- |
| FOCUS+ | FOCUS MOTOR+ |
| FOCUS- | FOCUS MOTOR- |
| PRESET - | DC 5V POTENTIOMETER POWER RETURN |
| PRESET ZOOM | ZOOM_PRESET |
| PRESET + | DC 5V LENS POTENTIOMETER POWER |
| PRESET FOCUS | FOCUS_PRESET |

**Camera & lens will be mounted on a bracket with connection PCB as below.**

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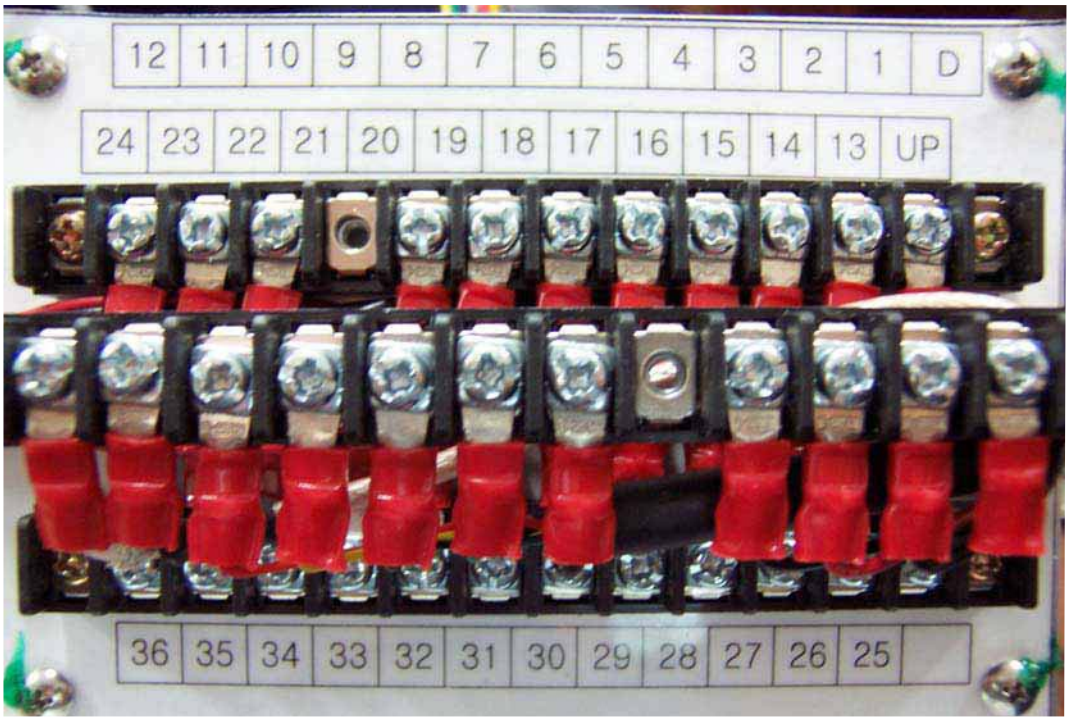
36-pin connection terminals in thermal camera enclosure




(only 33 terminals are used)

a. “D” of 36-pin Terminals means down-side(lower-side) 12 ea of terminals(Terminal No.1~12).
You can find that Pin No.9 is empty (Not connected) on above Fig 1.

b. “UP” of 36-pin Terminals means up-side(upper-side) 12 ea of Terminals(Terminal No.13~24).
You can find that Pin No.17 is empty (Not connected) on above Fig 1.

c.”SIGNAL NAME,FUNCTION, & PIN NAME of the above 36-Pin Terminal Description Table is same as the pin name of 55-pin system cable of thermal camera manual.

d.”TERMINAL No.”of above 36-Pin Terminal Description Table is same as Number of above Figure 1.

e.Don’t connect any lead wire to ” TERMINAL No. 18(SVIDEO SHIELD WIRE). Because thermal Camera has no SVIDEO SHIELD terminal.

## 7. EV3000-D Protocol & Control command list

Protocol: PELCO-D

| BYTE 1 | BYTE 2 | BYTE 3 | BYTE 4 | BYTE 5 | BYTE 6 | BYTE 7 |
|---|---|---|---|---|---|---|
| FF | Address | Command1 | Command2 | DATA 1 | DATA 2 | Checksum |

1) Data Communication Speed: Selectable among 2400, 4800, and 9600 BPS
   (Default baud rate: 2400 BPS)
2) Byte Format: 1 START, 8 DATA,1 STOP BIT
2) Receiver Address Range: 000~254
   (Default address: 001)

### Note: Bit Definition of Byte 3

Bit 6 is used to select Camera Between "DAY/NIGHT" Camera with Lens and the thermal Camera.
If set to "1", the Camera is Selected to DAY/NIGHT Camera.
If set to "0", the Camera is Selected to "THERMAL" Camera.

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## 1. Command List for EV3000-D(Basic format is PELCO-D) :

| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Pan Left | Command | FFh | Receiver ID | 00h | **04h** | **P1** | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1 = 00h ~ 3Fh : Pan Speed | | | | | | |
| 2 | Pan Right | Command | FFh | Receiver ID | 00h | **02h** | **P1** | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1 = 00h ~ 3Fh : Pan Speed | | | | | | |
| 3 | Tilt Up | Command | FFh | Receiver ID | 00h | **08h** | **00h** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 4 | Tilt Down | Command | FFh | Receiver ID | 00h | **10h** | **00h** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 5 | Pan Left & Tilt Up | Command | FFh | Receiver ID | 00h | **0Ch** | **P1** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 6 | Pan Right & Tilt Up | Command | FFh | Receiver ID | 00h | **0Ah** | **P1** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 7 | Pan Left & Tilt Down | Command | FFh | Receiver ID | 00h | **14h** | **P1** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 8 | Pan Right & Tilt Down | Command | FFh | Receiver ID | 00h | **12h** | **P1** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 9 | Pan/Tilt/ Zoom & Focus Stop at camera 1 & camera 2 | Command | FFh | Receiver ID | 00h or 40h | **00h** | **00h** | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Pan, Tilt, Zoom and Focus driving will be stopped at both camera 1 & camera 2 regardless of bit6 of Byte 3. | | | | | | |
| 10 | Zoom Wide at Camera 1 | Command | FFh | Receiver ID | 40h | **40h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.) | | | | | | |
| 11 | Zoom Tele at Camera 1 | Command | FFh | Receiver ID | 40h | **20h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.) | | | | | | |
| 12 | Wide field of view at camera 2 | Command | FFh | Receiver ID | 00h | **40h** | 00h | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 13 | Narrow field of view at camera 2 | Command | FFh | Receiver ID | 00h | **20h** | 00h | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 14 | Focus Far at Camera 1 | Command | FFh | Receiver ID | 40h | **80h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.) | | | | | | |
| 15 | Focus Near at Camera 1 | Command | FFh | Receiver ID | 41h | **00h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.) | | | | | | |
| 16 | Focus Near (Increments IR Focus closer) at camera 2 | Command | FFh | Receiver ID | 01h | **00h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 17 | Focus Far (Increments IR Focus farther) at camera 2 | Command | FFh | Receiver ID | 00h | **80h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 18 | Set Preset | Command | FFh | Receiver ID | 00h | **03h** | 00h | **P_ID** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P_ID=00~7Fh,The Receiver Stores Current Pan, Tilt, Zoom, Focus Position of Camera 1 in EEPROM. | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 19 | Clear Preset | Command | FFh | Receiver ID | 00h | **05h** | 00h | **P_ID** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P_ID=00~7Fh,The Receiver Clears Current Pan, Tilt, Zoom, Focus Position of Camera 1 in EEPROM. | | | | | | |
| 20 | Goto Preset Position | Command | FFh | Receiver ID | 00h | **07h** | 00h | **P_ID** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P_ID=00~7Fh, The Pan, Tilt, Zoom & Focus Position of Camera 1 Will be Moved to Stored Preset Position. | | | | | | |
| 21 | Turn on Wiper at Camera 1 | Command | FFh | Receiver ID | 40h | **09h** | 00h | **09h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 09h of Byte 6=Wiper of Camera 1. Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1 and The Wiper of Camera 1 Will be Driven for Several Seconds) | | | | | | |
| 22 | Turn off Wiper at Camera 1 | Command | FFh | Receiver ID | 40h | **0Bh** | 00h | **09h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 09h of Byte 6=Wiper of Camera 1. Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1 and The Wiper of Camera 1 Will be stopped.) | | | | | | |
| 23 | Turn on Pump | Command | FFh | Receiver ID | 00h | **09h** | 00h | **0Ah** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 0Ah of Byte 6=Pump.The Pump Will be Driven for Several Seconds. | | | | | | |
| 24 | Turn off Pump | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **0Ah** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 0Ah of Byte 6=Pump. The Pump Will be stopped. | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 25 | Turn on Wiper at Camera 2 | Command | FFh | Receiver ID | 00h | **09h** | 00h | **0Bh** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 0Bh of Byte 6=Wiper of Camera 2. Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2 and The Wiper of Camera 2 Will be Driven for Several Seconds.) | | | | | | |
| 26 | Turn off Wiper at Camera 2 | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **0Bh** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 0Bh of Byte 6=Wiper of Camera 2.Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2 and The Wiper of Camera 2 Will be stopped.) | | | | | | |
| 27 | Toggle Polarity | Command | FFh | Receiver ID | 00h | **09h** | 00h | **01h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 28 | Toggle auto span/Histogram Linear | Command | FFh | Receiver ID | 00h | **09h** | 00h | **02h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2) | | | | | | |
| 29 | NUC on the internal shutter | Command | FFh | Receiver ID | 00h | **09h** | 00h | **03h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 30 | Menu selection one position down | Command | FFh | Receiver ID | 00h | **09h** | 00h | **04h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 31 | Menu selection left pressed | Command | FFh | Receiver ID | 00h | **09h** | 00h | **05h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 32 | Menu selection Right pressed | Command | FFh | Receiver ID | 00h | **09h** | 00h | **06h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 33 | Show menu/accept | Command | FFh | Receiver ID | 00h | **09h** | 00h | **07h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 34 | Power state on | Command | FFh | Receiver ID | 00h | **09h** | 00h | **08h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 35 | Toggle palette | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **01h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 36 | Toggle sensitivity | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **02h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 37 | Toggle e-zoom | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **03h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 38 | One position up | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **04h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 39 | Move menu selection left released | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **05h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 40 | Move menu selection Right released | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **06h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 41 | menu selection cancel/exit | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **07h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 42 | Power state sleep | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **08h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 43 | AGC auto/on/ off | Command | FFh | Receiver ID | 00h | **2Fh** | 00h | **00~02h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Byte 6 = 1 (It will set to continuous auto adjust),Byte6=2 (It will set to manual adjust) | | | | | | |
| 44 | Set shutter speed | Command | FFh | Receiver ID | 00h | **37h** | 00h | **00~02h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh,Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Select sensitivity in Byte 6.[0 – low,1 – medium,2 - high] | | | | | | |
| 45 | Adjust white balance( R-B) | Command | FFh | Receiver ID | 00~01h | **3Bh** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) NUC using the internal shutter. | | | | | | |
| 46 | Adjust white balance( M-G) | Command | FFh | Receiver ID | 00~01h | **3Dh** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) NUC using an external surface. | | | | | | |
| 47 | Adjust gain | Command | FFh | Receiver ID | 00~01h | **3Fh** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Set absolute gain. | | | | | | |
| 48 | Adjust auto iris level | Command | FFh | Receiver ID | 00~01h | **41h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Set absolute level. | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 49 | Camera Power on at camera 2 | Command | FFh | Receiver ID | 00h | **09h** | 00h | **0Ch** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) DC 12V IR power supply of Thermal camera Will be electrically Turned On by EV3000-D Receiver Without any command sending to thermal camera (default state).But DC12V Defroster supply will always be turned on state. | | | | | | |
| 50 | Camera Power off at camera 2 | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **0Ch** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) DC 12V IR power supply of Thermal camera Will be electrically Turned Off by EV3000-D Receiver without any command sending to thermal camera. But DC12V Defroster supply will always be turned on state. | | | | | | |
| 51 | Initialize PAN/TILT | Command | FFh | Receiver ID | 00h | **0Fh** | 00h | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Pan/Tilt will go to Preset position No."0" which is stored in EEPROM of EV3000-D receiver when manufactured in factory. | | | | | | |

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## 2.Command List for Thermal camera (Basic format is PELCO-D) :

### Internal Communication Commands between EV3000-D Receiver and Thermal camera(4-Bytes command response)

| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Toggle Polarity | Command | FFh | Receiver ID | 00h | **09h** | 00h | **01h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 2 | Toggle auto span/Histogram Linear | Command | FFh | Receiver ID | 00h | **09h** | 00h | **02h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 3 | NUC on the internal shutter | Command | FFh | Receiver ID | 00h | **09h** | 00h | **03h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 4 | Menu selection one position down | Command | FFh | Receiver ID | 00h | **09h** | 00h | **04h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 5 | Menu selection left pressed | Command | FFh | Receiver ID | 00h | **09h** | 00h | **05h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 6 | Menu selection Right pressed | Command | FFh | Receiver ID | 00h | **09h** | 00h | **06h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 7 | Show menu/accept | Command | FFh | Receiver ID | 00h | **09h** | 00h | **07h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 8 | Power state on | Command | FFh | Receiver ID | 00h | **09h** | 00h | **08h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 9 | Toggle palette | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **01h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 10 | Toggle sensitivity | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **02h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 00h | 0Eh | | | |
| 11 | Toggle e-zoom | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **03h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 12 | One position up | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **04h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 13 | Move menu selection left released | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **05h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 14 | Move menu selection Right released | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **06h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 00h | 12h | | | |
| 15 | menu selection cancel/exit | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **07h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 16 | Power state sleep | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **08h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 17 | Narrow field of view | Command | FFh | Receiver ID | 00h | **20h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 18 | Wide field of view | Command | FFh | Receiver ID | 00h | **40h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 19 | Focus Near (Increments IR Focus closer) | Command | FFh | Receiver ID | 01h | **00h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 20 | Focus Far (Icrements IR Focus farther) | Command | FFh | Receiver ID | 00h | **80h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 21 | AGC auto/on/off | Command | FFh | Receiver ID | 00h | **2Fh** | 00h | 00~02h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 22 | Set shutter speed | Command | FFh | Receiver ID | 00h | **37h** | 00h | 00~02h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 23 | Adjust white balance(R-B) | Command | FFh | Receiver ID | 00~01h | **3Bh** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 24 | Adjust white balance(M-G) | Command | FFh | Receiver ID | 00~01h | **3Dh** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 25 | Adjust gain | Command | FFh | Receiver ID | 00~01h | **3Fh** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 26 | Adjust auto iris level | Command | FFh | Receiver ID | 00~01h | **41h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |

[Note for Byte 2]

Byte 2 is EV3000-D receiver address which can be adjusted from "0~254".

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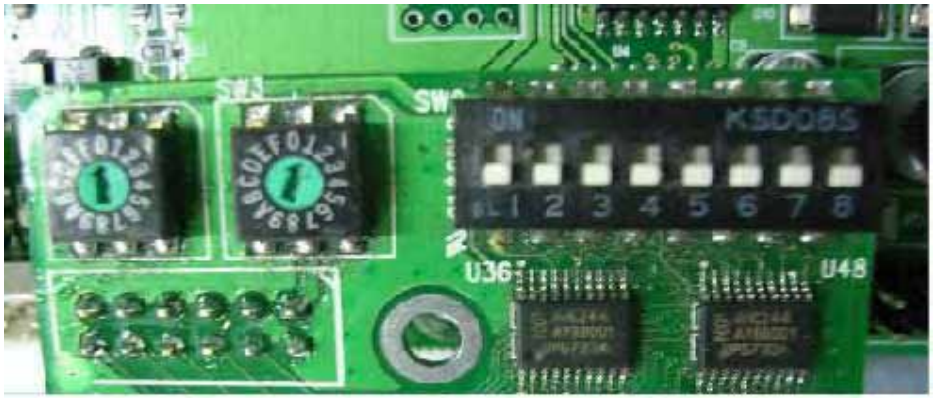
# 8. EV3000-D Address & Baud rate Setting




A) Baud rate Setting

- Set the Switch No.1 & No.2 of 8 POLE DIP Switch as bellows**.**

| Baud rate | Switch No1 | Switch No2 |
|---|---|---|
| 2400 BPS | OFF | OFF |
| 4800 BPS | ON | OFF |
| 9600 BPS | ON | ON |

- **Default: 2400 BPS**

B) Receiver Address Setting

- Set the SW3 and SW4 Hex-decimal Switches as bellows**.**

LSB SIDE (SW3): NO. 0 TO NO.15, MSB SIDE (SW4): NO. 16 TO NO. 255.

| Receiver address (Decimal number) | Sw4(Hexadecimal switch) MSB of hex-decimal Number | Sw3(Hexadecimal switch) LSB of hex-decimal Number |
|---|---|---|
| 15 | "0" POSITION | "F" POSITION |
| 28 | "1" POSITION | "C" POSITION |
| 100 | "6" POSITION | "4" POSITION |

- **Default Address: Set to "1" at factory.**

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# 9. WARRANTY

- Product Warranty

| | | |
|---|---|---|
| MODEL No. | | EV3000-D |
| SERIAL No. | | |
| Date of purchased | | |
| Place of Purchased | | |
| customer | name | |
| | address | |

If the product breaks down during proper use, it will be repaired within 1 year from the date of purchase free of charge

Please contact us:

Tel. (413)592-8477

E-mail: tech@unitedvisionsolutions.com

Http://www.unitedvisionsolutions.com

Address: 10 Center st., Suite 401 & 402, Chicopee, MA 01013 USA

(Pleas refer to our web-site)

| date | Detail | Agency | Repairman |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

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# Appendix A Care and Handling of EV3000-D

### A.1 Cleaning Optics

Follow the lens cleaning instructions below.

a. Examine lens surfaces carefully.

**NOTE: Removal of the thin film coating will seriously degrade optical performance. A change in apparent color indicates the loss of coating.**

- Remove all dust and debris with a soft bristle brush.
- Gently wipe the surface with a single stroke using pads moistened with a 50/50 mixture of isopropyl alcohol and acetone.

**CAUTION: DO NOT rub lens hard!**

d. Drag lightly across surface just fast enough for the liquid to evaporate behind the moving pad. Refer to the figure on the next page.

This should leave no streaks.

**CAUTION: DO NOT clean the lens in a circular motion!**

Follow above procedure with dust cloth to remove any remaining dust.

### A.2 Other External Surfaces

Clean as required with nonabrasive household cleaner.

### A.3 Handling

Use care to ensure that the EV3000-D is not excessively bumped or dropped. Even though the EV3000-D is a rugged instrument, it should be treated very carefully like any other sophisticated camera.

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# Appendix B

## Glossary

**Atmospheric Attenuation** – The amount of radiated IR energy that is absorbed by the atmosphere. It is a function of the temperature and humidity, particles in the air (i.e. fog, smoke, smog, etc.) and wavelength, among other factors.

**CCIR -** Video standard for monochrome, 50 field/sec interlaced video output (i.e. European standard black and white video).

**Critical Dimension –** The dimension of a target used in calculating the DRI performance. It is a function of length, width and height, as well as what face of the target is presented to the imager.

**DRI (Detection-Recognition-Identification)** – A method of characterizing the range performance of a thermal imager according to a standard set of criteria using a standard atmospheric model, and a target of alternating black and white stripe (cycles) at different temperatures.

**Detection –** The minimum distance at which an imager can reproduce a single cycle (black/white stripe) of a target. Typically used to represent the distance at which the imager can first detect a given target (i.e. a hot blob). In addition to the imager, the detection range is also a function of the target size and temperature difference from the background.

**Field of View (FOV)** – The area in space that is seen by the lens of a thermal imager. Usually expressed in degrees, and specified for both horizontal and vertical dimensions. The FOV is a characteristic of the lens.

**FLIR 92** – A set of standards defined by the Night Vision Laboratories for calculating DRI information.

**F-Number** – Focal Length/Diameter of Lens (same as in a visible lens). A lower F-number means that more IR radiation passes through, but the lens is larger.

**Focal Plane Array (FPA)** – An integrated circuit with a two dimensional matrix of detector elements that sits in the focal plane of the thermal imager. An imager that uses an FPA is referred to as a "staring" imager because the entire array stares at the scene to collect IR energy to make an image.

**Hyperfocal Distance** – The distance beyond which all objects are in focus when an imagers' focus adjust is set to infinity.

**Infrared Imager** – An Instrument that collects infrared energy and produces a video image where the gray scale values correspond to differences in temperature.

**Indium Antimonide (InSB)** – Semiconductor material used in the fabrication of a cooled FPA. Typically pronounced "Inns-Bee", these detectors must be cooled to 77°K to operate.

**Identification –** The distance at which an imager can resolve six cycles across a given target. Used to describe the distance at which a target can be clearly identified (in the case of a truck, the ability to discriminate between a T-72 and a Humvee). In addition to the imager, the recognition range is also a function of the target size and temperature difference from the background.

**Infrared (IR) –** The portion of the electromagnetic spectrum located just above visible light. The infrared spectrum extends from just above red (0.7 micron) to about 12 micron.

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**Instantaneous Field of View (IFOV)** - A measure of the spatial resolution of an IR detector. It is defined as the angle seen by an individual pixel in the FPA and is measured in milliradians.

**Kelvin Temperature Scale** - Absolute temperature scale related to the Celsius (or Centigrade) scale. 0° Kelvin (absolute zero) is equal to -273° C. The units of Kelvin are equal to Centigrade degrees. Therefore, room temperature (23°C) is equal to 296° K.

**Long Wave Infra Red (LWIR)** - The section of the infrared band from 7 microns to 12 microns.

**Micro-Cooler** - A miniature Sterling Cycle cooler used to provide cryogenic temperatures for the Focal Plane Array.

**Micron –** One millionth of a meter (10-6 m); Micron units are used to express the wavelength of light.

**Milliradian (mr) –** A measure of angle equal to one thousandth of a radian (1 radian = 180°/pi). Typically used to express the IFOV of an imager (1 mr = 0.0573°).

**Mid Wave Infra Red (MWIR) –** The portion of the infrared spectrum from 3 to 5 microns.

**Minimum Resolvable Temperature Difference (MRTD) –** A figure of merit for a particular FPA based imager, it defines the minimum temperature difference that can be resolved by the detector.

**Narcissus Reflection** - The reflection back into the image of the cooled detector. Because the detector is cooled to cryogenic temperatures, it will reflect back as an intense spot in the center of the image (black spot in white-hot mode).

**Narrow Field of View (NFOV)** – In a dual field of view lens, the NFOV is the smaller of the two fields (more magnification) and is used for identification, recognition and detection at longer ranges.

**Noise Equivalent Temperature Difference (NETD) –** A figure of merit for an FPA based imager, it defines the temperature difference that produces a signal just equal to the RMS noise signal.

**Non-Uniformity Correction** – A built in correction routine that calculates a set of field correction coefficients to apply to each pixel in the array to normalize their response for a given scene temperature.

**NTSC –** Video standard for color, 60 field/sec interlaced video output (i.e.

**US standard color video). PAL** - Video standard for color, 50 field/sec interlaced video output (i.e. European standard color video).

**Pixel –** Abbreviation for Picture Element, or each individual element that comprises a picture. Typical FPA's are arrays of 640 x 480, 320 x 480, or 256 x 256 pixels.

**Radian –** The angular measurement equal to the ratio of the arc length of a circle divided by the radius. A circumference of a complete circle is 2 pi times the radius, so a complete circle (360°) equal 2 pi radians, and pi radians = 180°. 1 radian = 57.3°.

**Recognition –** The distance at which an imager can resolve three cycles across a given target. Typically used to define the distance at which an imager can distinguish between a specific object in a group of similar objects. In addition to the imager, the recognition range is also a function of the target size and temperature difference from the background.

**RS170 –** Video standard for monochrome, 60 field/sec interlaced video output (i.e. US standard black and white video).

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**RS232 -** Serial communication standard using two wires – transmit and receive – and a common ground. Used for relatively short (<10 meter) cable runs.

**RS422 –** Serial communication standard using four wires – a transmit differential pair and a receive differential pair. For use where transmission cable runs go beyond ten meters.

**Short Wave Infra Red (SWIR)-** The portion of the infrared spectrum from 0.70 microns to 3 microns.

**Wide Field of View (WFOV) –** In a dual field of view lens, the WFOV is the wider of the two fields (less magnification) and is used for scanning a broader area at reduced resolution.

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| | | |
|---|---|---|
| **Contact us** | **For repair/service, or if problem(s) still exist after troubleshooting** | **Call Customer Service<br>+1-413-592-8477<br>tech@unitedvisionsolutions.com** |
| | **To order additional items and/or accessories** | **Call sales<br>1-413-250-0903<br>sales@unitedvisionsolutions.com** |
| | **For application support** | **info@unitedvisionsolutions.com** |

# United Vision Solutions

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Sales Dept. 413-592-8477

COMMERCIAL–IN-CONFIDENCE

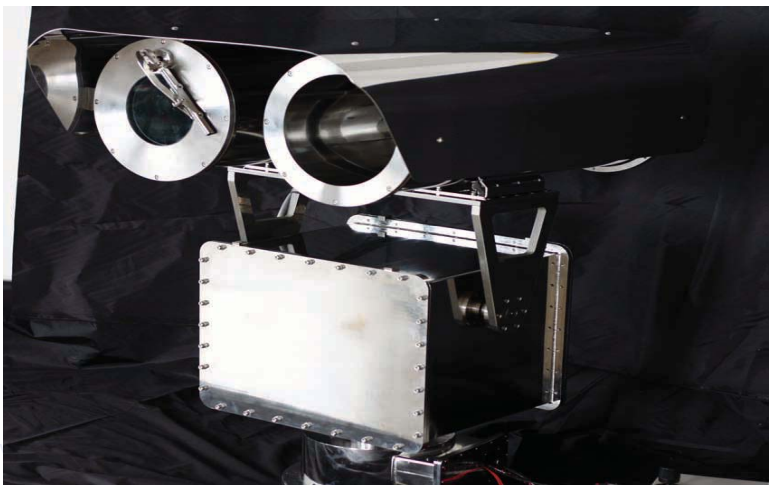
United Vision Solutions, Co.

# HomeLand Security Products & Solutions

# Eagle Vision EV3000-D IR

Dual camera system for 24/7 surveillance

Stainless Steel 316L enclosure and Pan/Tilt



**Forget rust and salt air corrosion**

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413-592-8477

## *System Highlights*

### Thermal Imager Tri-FOV

- 3-5 micron InSb detector
- 640X480 format
- DFOV
- 100/500 mm lenses

### *Pan/Tilt resolution*

High performance, brushless, maintenance-free step motors provide very precise, extremely effective motion control with preset and 0-360 degree endless rotation

### *Video Stabilizer*

– Digital Real Time Video Stabilization
– Sharp details for high quality video

### *Day/Night Camera*

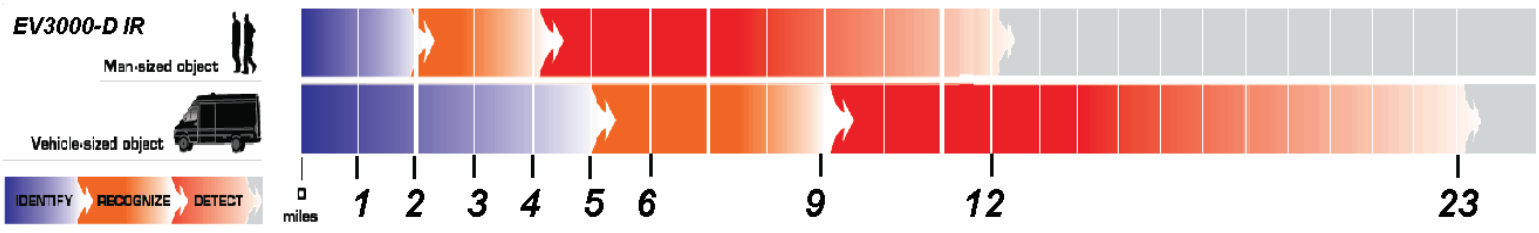
– 1/2” High-Resolution EMCCD
– 0.00025 Lux Minimum Illumination
– Lens 10-500mm / 20-1000mm
– Reproduces full colour, full motion images in starlight conditions

### *Sensor Platform*

– Heavy Duty, Stabilized Pan/Tilt
– Stainless Steel Enclosure
– Heavy duty enclosure for marine use with blower, heater, and sunshield
– Anti-rust, Anti-salt air, anti corrosion use with blower, heater, and sunshield

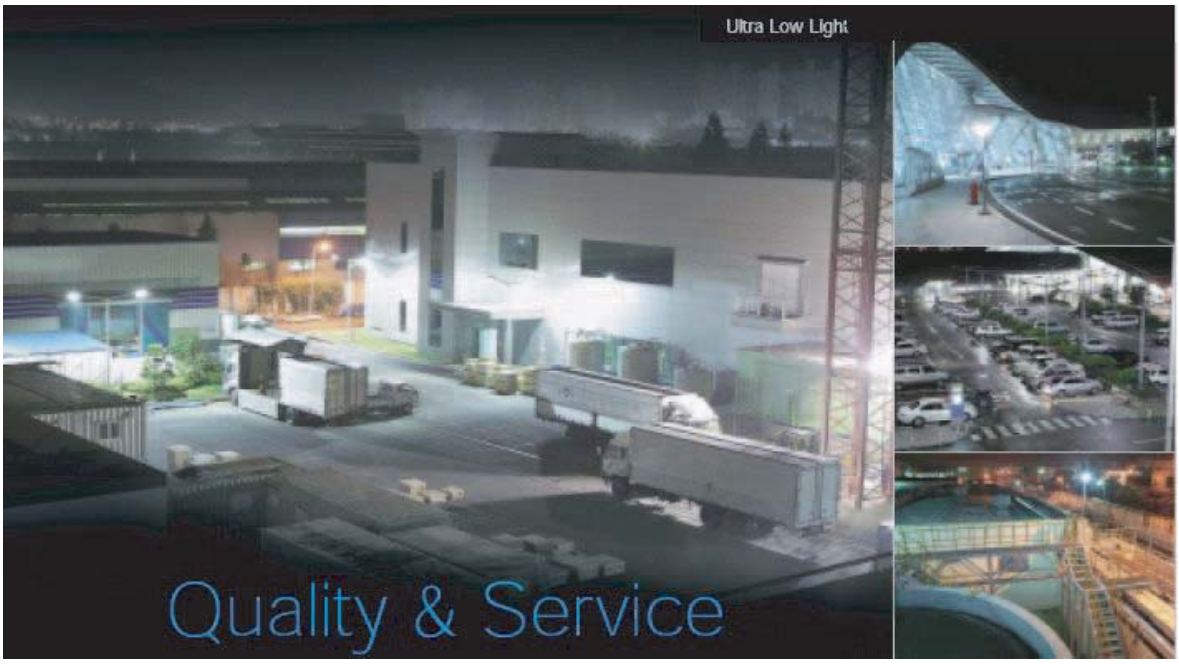
### *CCTV software with TCP/IP*

– Full control of Thermal / Day-Night / Pan/Tilt
– Using standard Protocol Pelco-D
- SDK software librarym for developing Control Softwware locally

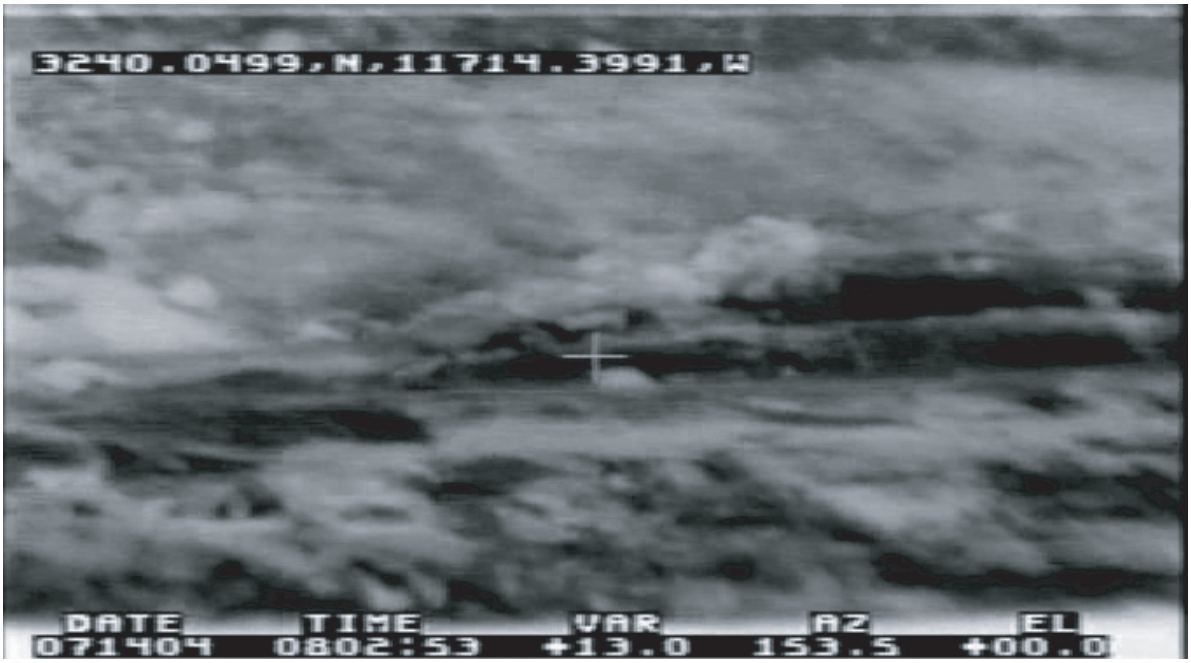



| | |
|---|---|
| Detection | Human at 12 miles |
| | Truck at 23 miles |
| Recognition | Human at 4 miles |
| | Truck at 9 miles |
| Identify | Human at 2 miles |
| | Truck at 5 miles |

Thermal Imager and Day-Night camera




Reproduces full colour, full motion images in starlight conditions




Truck at 22km

United Vision Solutions

UVS

Long Range Day Night Camera

CCTV Surveillance Systems

Detectors & Body Armor

### Day Camera Module

| | |
|---|---|
| Image sensor | 1/2" EMCCD night vision camera |
| Active P ixels | 658 x 496 P ixel |
| E ective Pixels | 319 k Pixel |
| Filter | Automatic mechanical IR cut filter |
| Resolution | Color : 560 TV Lines B/W : 700 TV Lines |
| shutter Speed | Manual (OF F, 1/60, 1/100, 1/250, 1/500, 1/1000, 1/2000) |
| Synchronisation | Internal / Line Lock |
| Min. Illumination | 0.000004 Lux |
| Signal/Noise ratio | 50 dB , |
| Back Light Compensation (BLC) | On/Off |
| White balance | ATW/One Push WB/MANUAL |
| Automatic Gain Control (AGC) | OF F, 0 dB to 18 dB (1 dB S tep S electable) |
| IRIS Control | DC / Video |

### optical zoom module

| | |
|---|---|
| Lens | Motorized lenses with focal 10-500/20-1000mm |
| Zoom | motorized zoom 50X |
| Angle of view | from 43.6º (WIDE end) to 0.5º (TELE end) |
| Zoom/Focus/IRIS | Motorized Zoom, and Focus<br>2X optical Extender<br>Auto video IRIS |

### Thermal Camera Module

| | |
|---|---|
| IR detector/sensor | cooled InSb / Staring FPA |
| Picture elements | 640x480 |
| Lens | 100/500mm 5.5° x 4.1° (WFOV) x 1.1° x 0.8° (NFOV) |
| Spectral Range | 3.4-5.1 m |
| Control Operation | AGC, Focus, FOV, On\Off, Video, Polarity, NUC, El Zoom |

### Electrical

| | |
|---|---|
| Input voltage | Choice from 115V AC, 230V AC, 24VA (DC for solar power) |
| Power consumption | 480 W max (two cameras system) |

### Connectivity

| | |
|---|---|
| Video | Co-axial via composite cable |
| Telemetry | Twisted pair. Simplex, half and full duplex operation via composite cable |
| Power | Via composite cable |

### Mechanical

| | |
|---|---|
| Drive unit | Integral pan/tilt motor drive |
| Pan angle | 0-350° (continuous rotation is option) |
| Pan speed | 0.1° to 50° per second |
| Tilt angle | -70° to +25° |
| Tilt speed | 0.1° to 25° per second |
| Speed control | Closed loop electronics |
| Preset accuracy | Better than 0.08° |
| FeedBack | Option |

### Physical

| | |
|---|---|
| Construction material | Grade 316 stainless steel |
| Viewing window | Tempered flat glass |
| Standard colours | Stainless steel (no colour options) |
| Standard finish | Stainless steel (no finish options) |
| Dimensions | Different Sizes Available |
| Weight | 270Kg |

### Environmental

| | |
|---|---|
| Operational temperature | -25°C to +55°C (coated with solar paint) |
| Weather proofing | IP66 |
| Explosive-proof | Exd IIC T5 |

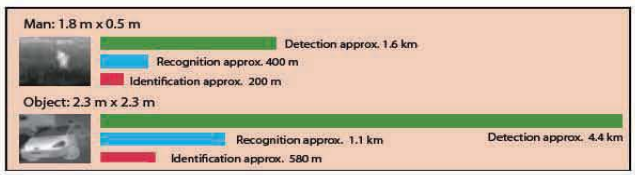
### Communication & Protocols

| | |
|---|---|
| Communication | RS485 / RS422 or TCP/IP |
| Control protocol | Pelco-D protocol |

### Available Options

| | |
|---|---|
| Camera module | IR camera cooled, uncooled, and day camera |
| Camera colour system | NTSC or PAL |
| Installed protocol | Pelco-D protocol |
| Telemetry control interface | RS422 or TCP/IP |
| Window wiper | Optional, factory fit |
| Washer | Optional, factory fit |
| Water tank | Optional, 10 ltrs or 25 ltrs |
| Heater | Optional, factory fit |
| Mounting | Custom kits for pole, tower, and side building |
| Cabling | Composite cable, UTP, or Fiber Optics |

*EV3000 with uncooled thermal IR 100mm and EMCCD 300mm for day/dark/night 24/7 smoke, fog, and all weathers*


Man: 1.8 m x 0.5 m
Detection approx. 1.6 km
Recognition approx. 400 m
Identification approx. 200 m
Object: 2.3 m x 2.3 m
Recognition approx. 1.1 km
Detection approx. 4.4 km
Identification approx. 580 m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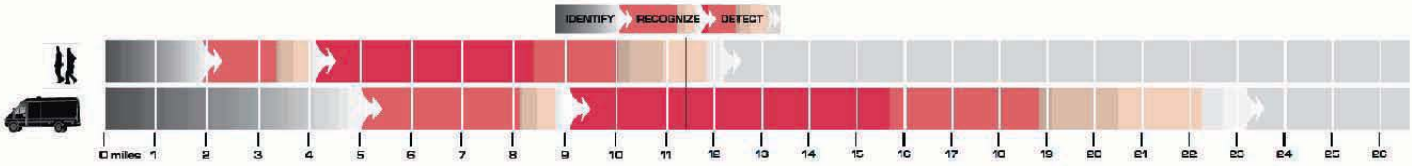
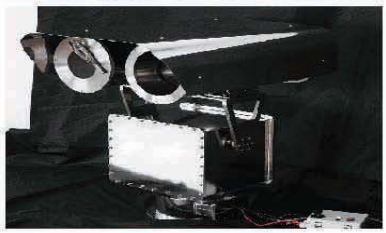



*EV3000 with cooled thermal IR camera 500mm, and EMCCD 500/1000mm dav camera*

*EV3000 use thermal energy to penetrate the atmospheric obscurants better and farther than visible light, allowing you to see what's out there through haze, smoke, dust and even light fog. Day and night, through good weather and bad, close up and far away*

*Thermal IR , EMCCD high resolution*
*Stainless Steel Enclosure and Pan/Tilt*
*Pelco-D protocol, power 110/220VAC*
*Wiper, Washer, and Sunshield*
*Anti-rust, anti-salt and anti-corrosion*
*TCP/IP Interface, RS485 serial control*
*Video Server Axis, and Video Stabilizer*



Long Range Day Night Camera

CCTV Surveillance Systems

Detectors & Body Armor

# Eagle Vision Surveillance System

## Highlights

**Hi-Resolutions Color Camera at day time.**
**Thermal Imaging at dark and bad weather.**
**Stainless Steel Enclosure for ultimate protection.**
**Stainless Steel Pan/Tilt unit, with precise step rotation 0.1 degree.**
**Low power Consumption, perfect choice when solar power is required.**
**Long Range wireless using Hi-tech codec system.**
**Stander Pelco D-Protocol to integrate with any off-shelf CCTV products.**

Selection of the EV3000 series is the lowest risk choice for user required 24/7 surveillance system, EV's **mature design**, broadly accepted **performance advantages**, and UVS's **proven integration capability**. Eagle vision Systems offers a very low schedule risk based on current production capacity, inventory and vertical integration. Low life-cycle cost and logistical experience also make Eagle Vision the low-risk choice, with its commitment to a carefully implemented, long-term support program. UVS's unique vertical integration insures that we can provide critical replacement components and servicing faster and at lower prices than other suppliers who depend on third parties.

## TECHNICAL DATA

The EV3000-D IR model is a self-contained day and thermal imaging system, the EV-ST IR camera which detects radiation in the 3.4 to 5.1-micron infrared band. The EV-ST is capable of target discrimination and recognition in total darkness or through daylight obscurants and was designed for short- or long-term stationary surveillance applications. The EV3000-D IR model imager is contained in an environmentally sealed stainless steel enclosure permitting deployment in severe climatic and weather conditions. Its DFOV (Dual Field-of-View) lens and low power consumption is ideal for use in field operations. The EV3000's Hi-resolution color camera brings sharp, crispy images around the clock, combined with AC or DC power sources and remote control capability, makes it well suited for long-range surveillance applications requiring remote operation.

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Delivering outstanding imaging performance, advanced features of the EV3000-D IR model include:

- 640 x 480 Pixel InSb Focal Plane Array with ultra-fine 15 µm detector pitch for high resolution imagery
- Auto-focus
- Ruggedized weatherproof Stainless Steel environmental enclosure
- High durability coated front lens
- Lens defroster
- 100/500mm, dual field-of-view optical zoom
- 2x and 4x digital zoom
- Internal NUC paddle
- Freeze frame
- Color or Monochrome video output
- Auto gain and level control
- Three integration times
- Tethered lens cover
- RS-422 interface
- S-video and RS170 outputs

The EV3000-D IR model is UVS Systems' next generation imager benefiting from unique developments aimed at mproving signal processing and imaging performance. Using High Resolution Video Processor (HRVP) generates the EV3000-D IR model's high quality images and long-range performance.

This multi-layer PCB (printed circuit card) is a unique feature and provides the user with an advanced suite of capabilities including:

- Advanced digital signal processing with temporal noise filters
- True multi-mode sensitivity (user selectable for hot or cold scenes)
- Histogram equalization
- Digital zoom
- Color palettes
- Freeze frame

The EV3000-D IR model imager also includes easily accessible and automated image processing software that automatically adjusts contrast and brightness levels for the scenes being viewed, simplifying operation by the agent. For more specialized situations, operators can choose between different sensitivity levels in the IR imaging system depending on the environmental conditions that affect the thermal contrast of people and vehicles under observation.

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United Vision Solutions

UVS

Long Range Day Night Camera

CCTV Surveillance Systems

*SkyCam & Eagle Vision*

# EV3000-D IR camera system

## EV3000-D IR with Focal Length 100/500 mm

| | |
|---|---|
| **F number** | f/4 |
| **WFOV NFOV** | 5.5° x 4.1°<br>1.1° x 0.8° |
| **IFOV, Wide / Narrow** | 0.15 mrad<br>0.03 mrad |

| | |
|---|---|
| Range miles | |
| Man Size Target | |
| Identification | 2 |
| Recognition | 4 |
| Detection | 12 |
| truck Size Target | |
| Identification | 5 |
| Recognition | 9 |
| Detection | 23 |

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**Hyperfocal distance is the distance beyond which all objects are acceptably**

**Min focus and hyperfocal are parameters related to focus adjustment not for range**
**When you are zooming in range 10 meters to 1500 meters you will find image crispy and really you will need to adjust focus. And for range greater than hyperfocal, the focus of lens start to have effect, and user sometimes need to refocus the lens to get crispy images**

Range of EV-3000 D IR high resolution with 640x480 resolutions

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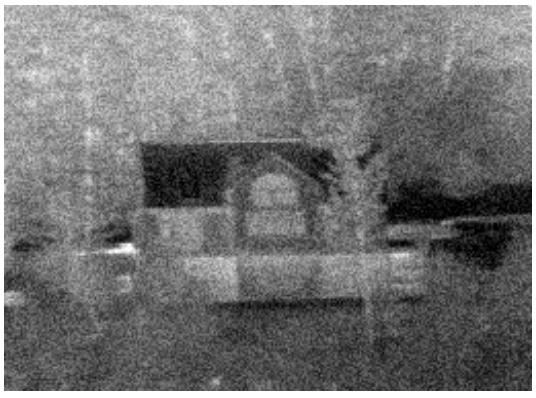
## High Resolution Video Processor

The HRVP (High Resolution Video Processor) board is a powerful digital image processing platform that provides an array of features designed for use in the EV3000-D IR model thermal imagers.
The HRVP will output corrected IR video in color (or monochrome), NTSC/PAL video format.
Basic display options will include manual gain, manual level, and image polarity. More sophisticated display options include continuous or on-demand auto-span (gain and level), digital zoom and histogram equalization. Auto-span and histogram equalization are based on programmable Regions Of Interest.
The 2x and 4x digital zoom is capable of operating in either pixel replication mode or bilinear interpolation mode. Pan capability within the zoomed image is supported. In addition, the HRVP contains the video processing hardware required to convert the FPA data to the final video stream output to the monitor.

The photographs below demonstrate the improved imaging performance the advanced HRVP video processor provides to the end user. Cleaner edges, sharper contrast and smoother images all work together to provide the user a more useable picture on the monitor contributing to better target recognition and minimized user strain and eye fatigue.



*Original Image*

*Filtered Image*

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## NETD

The EV3000-D IR model has an NETD of less than 40mk@23°C. Most camera systems will exceed the requirement, and the typical system NETD is 35mk. This sensitivity is a result of a highly sensitive detector array, efficient f/4 optics and high-performance electronics.

EV3000-D IR model provides additional sensitivity and target recognition capability through Digital Detail Enhancement (DDE). DDE is an electronic image processing algorithm that allows the system operator to see image details in even the most difficult conditions. In uniformly hot scenes of very high contrast (like those encountered in the desert) it can be hard for an imager to break out the detail an operator needs to recognize a human target at long range. Such details are often lost in the surrounding clutter, allowing targets to escape detection. Even in scenes without any discernable target contrast, DDE brings details out for classification, providing a distinct tactical advantage to EV3000-D IR model users.

## Acceptance Testing

*United Vision Solutions shall plan, perform and report acceptance testing in accordance with United Vision Solutions' Acceptance Plan to be approved by the buyer. United Vision Solutions has extensive experience working with customers around the world, and we are committed to the delivery of products that are in conformance with the requirements.*

*The topmost picture shows raw imagery with DDE off, while the bottom image demonstrates the effects of having DDE on.*

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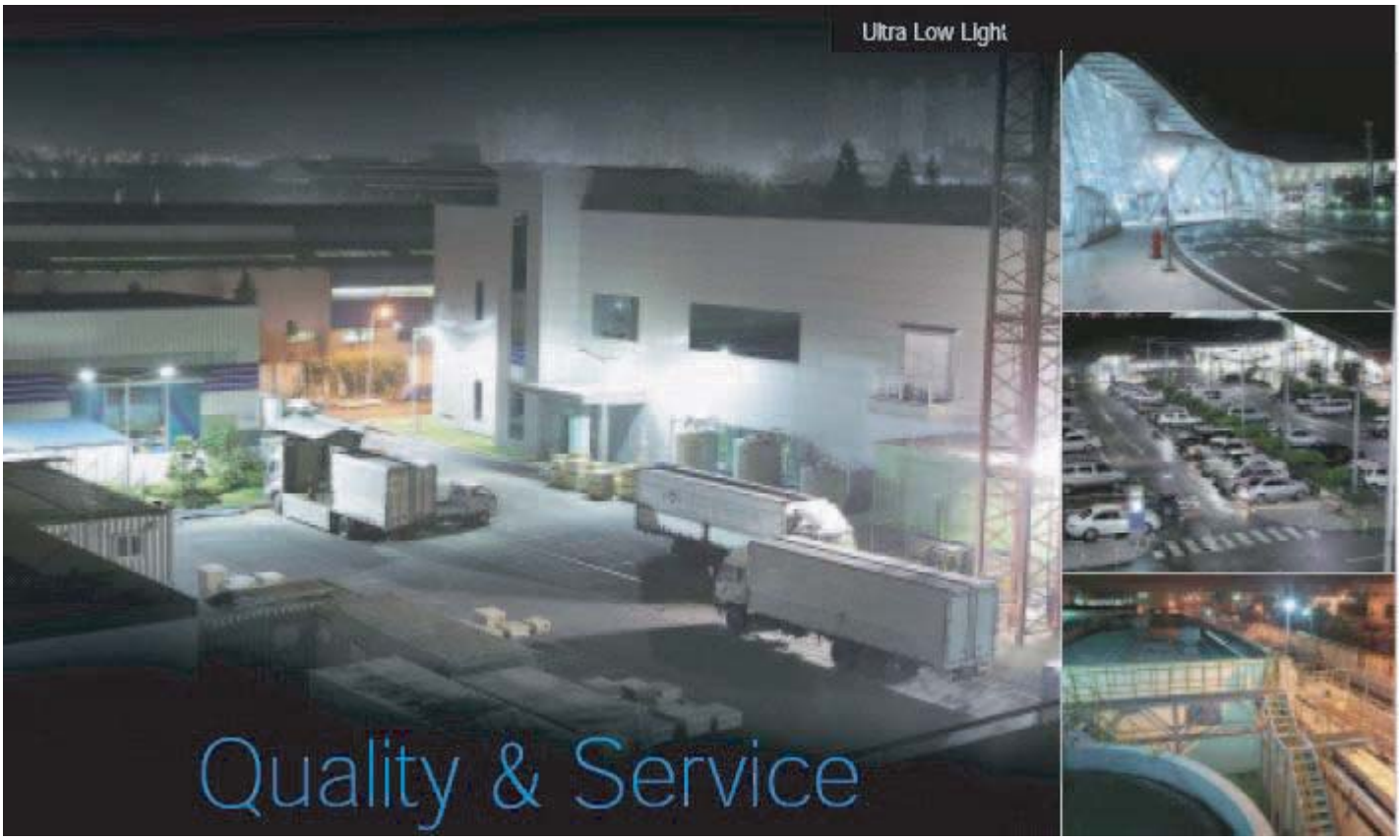
# Day/Night CCTV Camera System

EXTREME LOW LIGHT COLOUR VIDEO CAMERA




*Achieves sensitivity and dynamic range in excess of current generation night-vision cameras and provides full colour at 30 FPS in near total darkness!*

| FEATURE | BENEFIT |
|---|---|
| 0.00025 Lux Minimum Illumination | Reproduces full colour, full motion images in starlight conditions |
| 50 dB S/N Ratio | Provides industry leading sharpness in ALL light conditions |
| Electron Multiplying CCD (EMCCD) | Generates new electrons dramatically increasing sensitivity at very fast speeds without the common readout noise of traditional CCD |
| Adaptive Recursive Noise Reduction | Reduces CCD output buffer noise in low light conditions |
| Peltier Cooled CCD | Maintains constant temperature of CCD to maximize low light performance |

# EXTREME LOW LIGHT COLOUR VIDEO CAMERA

| | |
|---|---|
| Image Sensor | 1/2 inch CCD |
| Active Pixels | 658 x 496 Pixel |
| E ective Picture Element | 319 k Pixel |
| Video Output Signal | VBS (NTSC:BNC), Y/C |
| Lens Mount | C Mount (Lens Not Included With Camera) |
| SYNC System | Internal |
| Resolution | 420 TVL (NTSC OUT) |
| Minimum Illumination | 0.001 Lux (F1.2 CMG x 1000, AGC 12 dB, White 50%)<br>0.00025 Lux (F1.2 CMG x 1000, AGC 12 dB, White 10%)<br>0.000004 Lux (256 x long term exposure*, AGC O , White 10%) |
| S/N Ratio (NTSC) | 50 dB |
| White Balance | ATW/One Push WB/MANUAL |
| IRIS Control | Auto Iris Lens (EE/DC) |
| Electric Shutter | Manual (OFF, 1/60, 1/100, 1/250, 1/500, 1/1000, 1/2000) |
| GAIN | OFF, 0 dB to 18 dB (1 dB Step Selectable) |
| Charge Multiplication GAIN (CMG) | x 1000 approximately (maximum) |
| Backlight Compensation | 7-Mode Selectable, 16 Area Photometry |
| Frame Rate | 30 Frames Per Second |
| Camera Control | RS-232C (Dsub-9p) |
| Power Supply | 12 V DC |
| Power Consumption | At 77 °F: 6 watts, At 104 °F: 12 watts |
| Operating Temperature | 14 °F to 113 °F |
| Humidity | 90% Maximum |
| Weight | 15.8 oz (450 g) |
| Dimensions | 2.28" (W) x 2.3" (H) x 5.24" (D) |
| Emission Standard | FCC Class A |
| Warranty | One Year Limited Warranty |

**Slow Shutter*

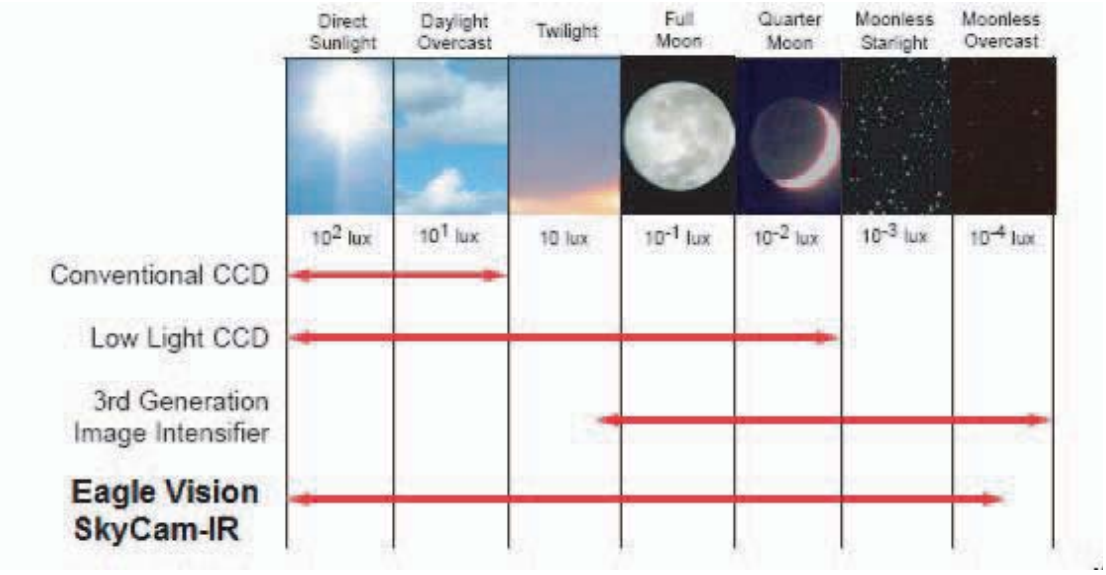
## APPLICATIONS

Suggested applications for the camera:

- Military
- Bio Science
- Scienti c
- Non-Destructive Testing
- Extreme Low Light Underwater Video
- Realism Broadcast TV
- Mine & Safety Inspection

## WHAT IS EMCCD?

Electronic multiplying architecture di ers from traditional CCD technology in that a gain register is inserted between the end of the shift register and the output amplier. The gain register has two phases with independent electrodes, each holding a di erent voltage potential. The resultant intense electric eld causes the electrons to undergo impact ionization. This generates new electrons that manifest themselves as dramatically increased sensitivity at very fast speeds without the common readout noise of traditional CCDs. **The result is virtually noiseless 30 FPS full color in near total darkness** .



# CCTV LENSES DAY & NIGHT

## 50x Motorized Zoom

## 10-500mm / 20-1000mm (2x Ext.)

| | | |
|---|---|---|
| Format | | 1/2” |
| Mount | | C |
| Zoom Ratio | | 50x |
| Focal Length | | 10- 500 mm /20-1000mm (with 2ex.) |
| Iris Range | | F4.0 - 125(360) /F8.0-250(720) (with 2ex.) |
| Angle of View (HxW) | WIDE | 43.6 (D) x 35.5 (H) x 27.0 (V)° : 22.6 (D) x 18.2 (H) x 13.7 (V)° (with 2ex.) |
| | TELE | 0.9 (D) x 0.7 (H) x 0.6 (V)° : 0.5 (D) x 0.4 (H) x 0.3 (V)° (with 2ex.) |
| M.O.D. | | 4m |
| Back Focal Length | | 62.67 mm |
| Flange Back Length | | 17.526mm |
| Filter Screw Size | | M95 P = 1 |
| Dimension (WxHxL) | | 124.0 (W) x 106.0 (H) x 300.5 (L) mm |
| Weight | | 3200g |
| Operation | Iris | Video with Mabual Override |
| | Zoom | Motorized with Preset |
| | Focus | Motorized with Preset |
| OPERATING TEMPERATURE | | -10 - +50 C |

# Long Range Dual Camera System

# Eagle Vision

## USER'S MANUAL

## EV3000-D

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# Important Notice

**The manual is organized into two main sections, section A describes the system components, system installation, and section B describes system operation.**

## EXPORT CONTROL

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## Safety Summary

This manual describes processes that may cause injury or death to personnel, or damage to equipment if not properly followed. This safety summary includes general safety precautions and instructions that must be understood and applied during operation and maintenance to ensure personnel safety and protection of equipment. Prior to performing any task, the WARNINGs, CAUTIONs and NOTEs included in that task shall be reviewed and understood.

### WARNINGS, CAUTIONS, NOTES

**WARNING**

Used to indicate a location, equipment or system where a potential hazard exists capable of producing injury to personnel if approved procedure is not followed.

**CAUTION**

Used to indicate an operating or maintenance procedure, practice, condition, statement, etc., which, if not strictly observed, could result in damage to or destruction of equipment or loss of mission effectiveness or long term health hazards to personnel.

**NOTE: Used to indicate an essential operating or maintenance procedure, condition, or statement.**

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## Section A

# Installation's Manual

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# 1. Introduction

The EV3000-D is a Dual Camera system with Pan Tilt Driver & Camera System with two Cameras and Camera Control Unit.

The 1st camera is infrared (IR) camera intended for use during dark or night time, as a long range thermal imaging surveillance system and the other is Day/Night camera plus zoom lens.

This product can be used where the rugged system is required for harsh-environment as ports, offshore, and marine applications, it is apt to be corroded in salt such as shore or ship due to its material Stainless Steel 316 against corrosion.

And this product is used in border surveillance for military, police, emergency services incorporating thermal imager.

The remote-control unit can rotate this product vertically or horizontally through the built-in receiver.

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# 2. Specifications

# A- Thermal Camera

| Camera Specification | Thermal Camera EV4000 |
|---|---|
| **Sensor** | |
| **Sensor type** | Staring FPA |
| **Detector Material** | InSb |
| **Array Size** | 640 X 480 |
| **Spectral Band** | 3.4-5.1µm |
| **FPA Cooling** | IDCA |
| **Cooldown Time** | 6-8 min |
| **Optics** | |
| **Focal Length** | 100/500 mm |
| **F number** | f/4 |
| **WFOV** | 5.5° x 4.1° |
| **NFOV** | 1.1° x 0.8° |
| **IFOV, Wide** | 0.15 mrad |
| **IFOV, Narrow** | 0.03 mrad |
| **Min Focus Distance, WFOV** | 10 m |
| **Min Focus Distance, NFOV** | 10 m |
| **Hyperfocal Distance, WFOV** | 50 m |
| **Hyperfocal Distance, NFOV** | 1500 m |
| **Image Output** | |
| **Video Output** | 60 or 50 Hz frame rate, interlaced, NTSC or CCIR |
| **Symbology Overlay** | Selectable On/Off |
| **Number of Reticles** | 4 |

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**B- DLTV camera (day light CCD camera)**

Eagle Vision Surveillance that Never Sleeps

# EV-EMCCD

Eagle Vision Surveillance Camera Sysytem that Never Sleeps

With its built-in night vision Electron Multiplying CCD the Eagle Vision has a light sensitivity that is more than 100 times better than average. The fact that this camera has been selected as the solution for the unmanned surveillance needs of military front lines proves its capability.

The Eagle Vision can detect and distinguish a moving subject from over 400m (approx. 440yds) away in a pitch-dark environment, and send the image to a military command center for immediate response.

PECIFICATIONS

# Power Source : 12V DC (±10%)
# Power Consumption: Max. 1.2A
# Total Pixels: 680(H) x 500(V)
# Effective Pixels: 658(H) x 496(V)
# Scanning System : 2 : 1 Interlace ~ 525 Lines / 60 Fields / 30 Frames
# Synchronization: Internal / Line lock selectable
# Scanning Frequency: Horizontal : 15,734KHz / Vertical : 59.94H
# Resolution: Color : 450TV lines (Min.) / B/W : 470TV lines (Min.)
# Video Output: 1.0Vp-p / 75?(Video 0.714Vp-p, Sync 0.286Vp-p)
# S / N Ratio (Y signal): 50dB (AGC off, Weight on)
# Min. Illumination : 0.008Lux @ F1.2 (Normal color mode) 0.0005Lux @ F1.2
(B/W mode) 0.00006Lux @ F1.2 (Sens-up mode)
# Back Light Compensation : Low / Middle / High / Off selectable
# Day & Night : Color / B/W / Auto selectable (ICR filter change) /
EXT (External Day & Night mode control capability via terminal at the back panel)
# Gain Control : Low / High / Off selectable
# White Balance : ATW / AWC / Manual selectable (1800°K ~ 10,500°K)
# Electronic shutter speed : A.FLK / Manual (1/60, 1/120, 1/250, 1/500, 1/1,000, 1/1,600, 1/2,000sec)
# Sens-Up : On / Off (Selectable limit ~ 128X)
# O.S.D :Built-in
# Motion Detection : On / Off selectable (Built-in alarm output connector)
# SSNR : Low / Middle / High / Off selectable
# Privacy Function : On / Off selectable (4 Programmable zone)
# Communication : RS-485
# Iris Control : DC / Video
# Lens Mount : CS-mount (Easy focus type) (C-mount is mountable by using adaptor)
# Operating Temperature : -10°C ~ +60°C
# Operating Humidity : 20 ~ 90% RH
# Dimension : 375(W) x 565(H) x 628(L)mm
# Weight :30kg

| | |
|---|---|
| **Electrical** | |
| **Power Source** | 100 to 240 VAC 50-60 Hz |
| **On from Standby** | 3 seconds |
| **External Supply** | 12 Vdc, 3 Amps |
| **Physical** | |
| **Weight, Imaging Head** | 22 lbs (10 kg) |
| **Dimensions (nominal)** | L x Diameter |
| **Inches** | 22 x 9 |
| **Cm** | 56 x 13.5 |
| **Operating Temp** | -32°C to +55°C |
| **Storage Temp** | -46°C to +71°C |
| **Environmental** | Fully ruggedized per MIL-STD 810E |
| **Tripod Mountable** | Yes |

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# C- Pan/Tilt and Enclosure

| | |
|---|---|
| **Materials** | Stainless steel 316L |
| **Enclosure** | Pressurized rugged fill with Dry Nitrogen which prevents condensation inside the tube |
| **Wiper** | 24 VAC wipers, one for each enclosure |
| **Washer** | Pump with 10 ltr water tank |
| **Rotating angle** | Pan 0°to 360°/ Tilt -90°to +90°±5° |
| **Rotating speed** | Pan :0.1°~ 6°/sec, Tilt :0.1°~ 3°/sec Max |
| **Motor** | Step motor (DC 24V/6A, Pan 96W / Tilt 96W) |
| **Power Supply** | AC 110 / 220 VAC |
| **Temperature** | -25 to +50 |
| **Weight** | About 70 kg |
| **Preset** | 000~127(128 Presets) |
| **Interface** | RS-422 |
| **Receiver address** | 000~254(255 Addresses) |
| **Baud rate** | Selectable by DIP switch among 2400,4800, &9600 BPS<br>[Default : 2400BPS] |
| **Protocol** | PELCO-D (8 Data,1 stop, No parity) |
| **Camera & Lens Control** | 1)Thermal camera : Controlled by RS-422<br>2)Day/night camera : Zoom-in/out, Focus-near/far |
| **AUX Control** | 1)Two wipers<br>(Thermal camera and Day/night camera side)<br>2)One Pump |
| **Video** | 1)Thermal camera : BNC & SVIDEO (4Pin din connector)<br>2)Day/night camera : BNC |

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## 3. EV3000-D installation Notes

| | |
|---|---|
| | Before operation the unit, you must read this user's Manual thoroughly and retain it for future reference. |
| | Before cleaning the unit, you must remove it from the wall or bracket. You must clean it with a wet cloth. Never use liquid cleanser. |
| | Enough space must be ensured to installation of this P/T and never rotate PAN/TILT housing forcibly without driving by remote controller. |
| | Be careful not to put this unit on an unstable stand, tripod, shelf, or Table. |
| | Do not leave the unit in a location near heat sources or humidifier. |
| | Be careful of electric overload on the electric terminal or extension cable, otherwise there can be risk of permanent damage. |
| | You must stop operation this unit and never connect the connector of the cable to the unit in case of the following situations.<br>● In case of the control cable being damaged.<br>● When any liquid or unfavorable materials fall into the unit.<br>● When the unit doesn't work properly according to the instruction.<br>● When the unit fell down or the P/T was damaged. |
| | You must make an expert examine the accessories whether they have the same specific character when you need replacement of them. |
| | You must install AC24V power source near the EV3000-D (within 10m) Otherwise The EV3000-D will probably malfunction due to AC voltage drop or critical noise etc. |

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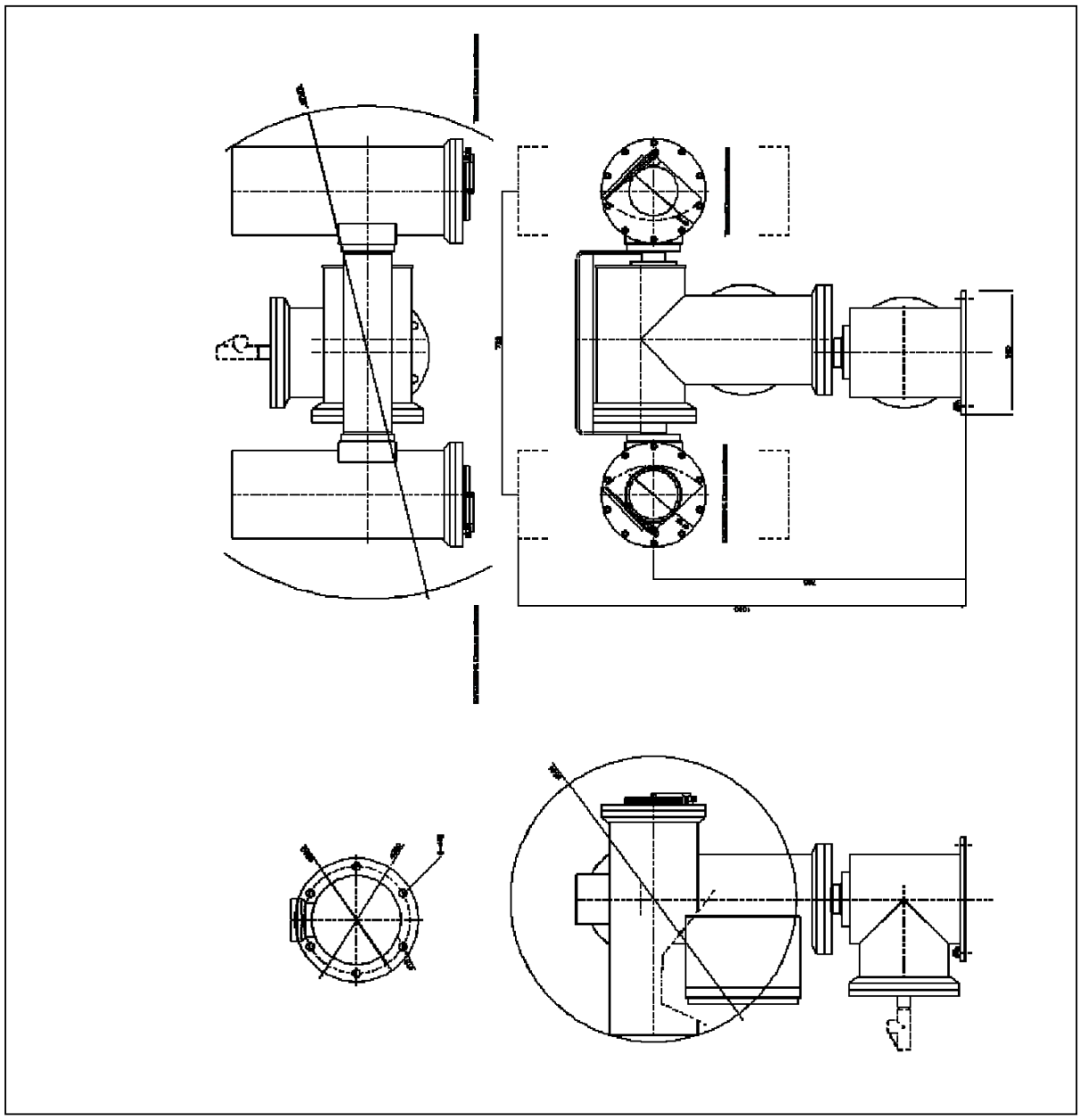
## 4. EV3000-D Drawing



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# 5. EV3000-D Wiring:

1) AC 24V Power Connection Terminals (Use AWG16 or 18 Wire)

-AC24V POWER -AC24V COM

2) Earth Terminal

-CONNECT EARTH LINE TO ⏚ **Terminal**

2) Thermal camera Video Connection Terminals

-THERMAL VIDEO (BNC)

-THERMAL SVIDEO (4-PIN DIN CONNECTOR)

3) Day/night camera Video Connection Terminal

-DAY/NIGHT VIDEO (BNC)

4) RS422 Data Communication line Connection Terminals

-TX+ (FROM EV3000-D TO OUTSIDE CONTROLLER or PC)

-TX- (FROM EV3000-D TO OUTSIDE CONTROLLER or PC)

-RX+ (FROM OUTSIDE CONTROLLER or PC TO EV3000-D)

-RX- (FROM OUTSIDE CONTROLLER or PC TO EV3000-D

-SHIELD: NO CONNECTION or CONNECT SHIELD WIRE OF OUTSIDE RS-422 DATA COMMUNICATION LINES

5) Pump Connection Terminals: Connect to DC24V+, DC24V- Terminals

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# 6. EV3000-D Enclosure Wiring

## 6-1.Thermal camera connection at thermal camera terminal

| TERMINAL No. | SIGNAL NAME | FUNCTION | PIN NAME |
|---|---|---|---|
| 1 | GND_IR | 12V DC SUPPLY RETURN FOR IR CAMERA | a |
| 2 | GND_IR | 12V DC SUPPLY RETURN FOR IR CAMERA | e |
| 3 | GND_IR | 12V DC SUPPLY RETURN FOR IR CAMERA | s |
| 4 | GND_IR | 12V DC SUPPLY RETURN FOR IR CAMERA | t |
| 5 | VDC+_IR | 12V DC FOR IR CAMERA\ | M |
| 6 | VDC+_IR | 12V DC FOR IR CAMERA | N |
| 7 | VDC+_IR | 12V DC FOR IR CAMERA | h |
| 8 | VDC+_IR | 12V DC FOR IR CAMERA | i |
| 9 | NONE | NONE | |
| 10 | RS422EN | RS-422 ENABLE | p |
| 11 | GNDD | GROUND REFERENCE FOR THE SERIAL COMM. LINES | A |
| 12 | GND_SHASSIS | CHASSIS GROUND | K |
| 13 | RXD1_422+ | RS-422 RECEIVE+(FROM 804D TO CAMERA) | n |
| 14 | RXD1_422- | RS-422 RECEIVE-( FROM 804D TO CAMERA) | T |
| 15 | TXD1_422+ | RS-422 TRANSMIT+(FROM CAMERA TO 804D) | B |
| 16 | TXD1_422- | RS-422 TRANSMIT-(FROM CAMERA TO 804D) | W |
| 17 | NONE | NONE | |
| 18 | NONE | S-VIDEO SHIELD WIRE(Not used) | |
| 19 | SVIDEO_GND | S-VIDEO LUMINANCE GND | u |
| 20 | SVIDEO_GND | S-VIDEO CHROMINANCE GND | H |
| 21 | SVIDEO_Y | S-VIDEO LUMINANCE | v |
| 22 | SVIDEO_C | S-VIDEO CHROMINANCE | J |
| 23 | RS170GND | COMPOSITE VIDEO GND | F |
| 24 | CVIDEO_1 | COMPOSITE VIDEO | b |
| 25 | GND_DF | GROUND RETURN FOR DEFROSTER | C |
| 26 | GND_DF | GROUND RETURN FOR DEFROSTER | X |
| 27 | GND_DF | GROUND RETURN FOR DEFROSTER | m |
| 28 | GND_DF | GROUND RETURN FOR DEFROSTER | q |
| 29 | GND_DF | GROUND RETURN FOR DEFROSTER | CC |
| 30 | GND_DF | GROUND RETURN FOR DEFROSTER | DD |
| 31 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | S |
| 32 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | k |
| 33 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | AA |
| 34 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | BB |
| 35 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | FF |
| 36 | VDC+_DF | DC 12V SUPPLY FOR DEFROSTER | HH |

Please connect lead wires from thermal camera correctly to these terminals.

Otherwise,Electronic devices in EV3000-D receiver may be damaged.

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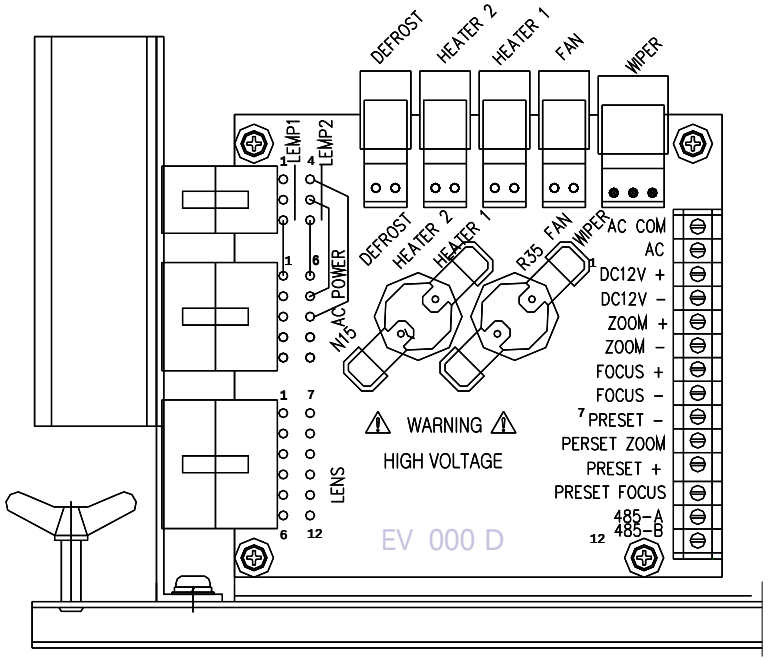
## 6-2 Day/night camera connection at Day/night camera terminal

| SIGNAL NAME | FUNCTION |
|---|---|
| DC 12V + | DC 12V CAMERA POWER |
| DC 12V - | DC 12V CAMERA POWER RETURN |
| ZOOM+ | ZOOM MOTOR+ |
| ZOOM- | ZOOM MOTOR- |
| FOCUS+ | FOCUS MOTOR+ |
| FOCUS- | FOCUS MOTOR- |
| PRESET - | DC 5V POTENTIOMETER POWER RETURN |
| PRESET ZOOM | ZOOM_PRESET |
| PRESET + | DC 5V LENS POTENTIOMETER POWER |
| PRESET FOCUS | FOCUS_PRESET |

**Camera & lens will be mounted on a bracket with connection PCB as below.**

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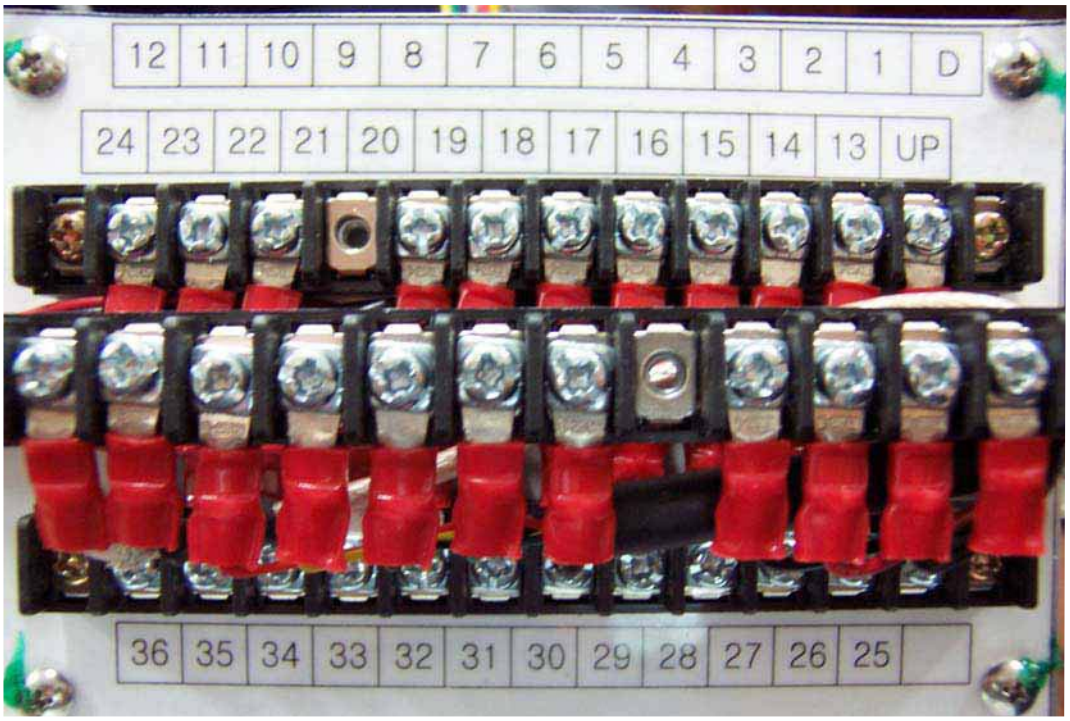
36-pin connection terminals in thermal camera enclosure




(only 33 terminals are used)

a. “D” of 36-pin Terminals means down-side(lower-side) 12 ea of terminals(Terminal No.1~12).
You can find that Pin No.9 is empty (Not connected) on above Fig 1.

b. “UP” of 36-pin Terminals means up-side(upper-side) 12 ea of Terminals(Terminal No.13~24).
You can find that Pin No.17 is empty (Not connected) on above Fig 1.

c.”SIGNAL NAME,FUNCTION, & PIN NAME of the above 36-Pin Terminal Description Table is same as the pin name of 55-pin system cable of thermal camera manual.

d.”TERMINAL No.”of above 36-Pin Terminal Description Table is same as Number of above Figure 1.

e.Don’t connect any lead wire to ” TERMINAL No. 18(SVIDEO SHIELD WIRE). Because thermal Camera has no SVIDEO SHIELD terminal.

## 7. EV3000-D Protocol & Control command list

Protocol: PELCO-D

| BYTE 1 | BYTE 2 | BYTE 3 | BYTE 4 | BYTE 5 | BYTE 6 | BYTE 7 |
|---|---|---|---|---|---|---|
| FF | Address | Command1 | Command2 | DATA 1 | DATA 2 | Checksum |

1) Data Communication Speed: Selectable among 2400, 4800, and 9600 BPS
   (Default baud rate: 2400 BPS)
2) Byte Format: 1 START, 8 DATA,1 STOP BIT
2) Receiver Address Range: 000~254
   (Default address: 001)

### Note: Bit Definition of Byte 3

Bit 6 is used to select Camera Between "DAY/NIGHT" Camera with Lens and the thermal Camera.
If set to "1", the Camera is Selected to DAY/NIGHT Camera.
If set to "0", the Camera is Selected to "THERMAL" Camera.

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## 1. Command List for EV3000-D(Basic format is PELCO-D) :

| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Pan Left | Command | FFh | Receiver ID | 00h | **04h** | **P1** | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1 = 00h ~ 3Fh : Pan Speed | | | | | | |
| 2 | Pan Right | Command | FFh | Receiver ID | 00h | **02h** | **P1** | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1 = 00h ~ 3Fh : Pan Speed | | | | | | |
| 3 | Tilt Up | Command | FFh | Receiver ID | 00h | **08h** | **00h** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 4 | Tilt Down | Command | FFh | Receiver ID | 00h | **10h** | **00h** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 5 | Pan Left & Tilt Up | Command | FFh | Receiver ID | 00h | **0Ch** | **P1** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 6 | Pan Right & Tilt Up | Command | FFh | Receiver ID | 00h | **0Ah** | **P1** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 7 | Pan Left & Tilt Down | Command | FFh | Receiver ID | 00h | **14h** | **P1** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 8 | Pan Right & Tilt Down | Command | FFh | Receiver ID | 00h | **12h** | **P1** | **P2** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P1=00h~3Fh: Pan Speed ,P2 = 00h ~ 3Fh : Tilt Speed | | | | | | |
| 9 | Pan/Tilt/ Zoom & Focus Stop at camera 1 & camera 2 | Command | FFh | Receiver ID | 00h or 40h | **00h** | **00h** | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Pan, Tilt, Zoom and Focus driving will be stopped at both camera 1 & camera 2 regardless of bit6 of Byte 3. | | | | | | |
| 10 | Zoom Wide at Camera 1 | Command | FFh | Receiver ID | 40h | **40h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.) | | | | | | |
| 11 | Zoom Tele at Camera 1 | Command | FFh | Receiver ID | 40h | **20h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.) | | | | | | |
| 12 | Wide field of view at camera 2 | Command | FFh | Receiver ID | 00h | **40h** | 00h | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 13 | Narrow field of view at camera 2 | Command | FFh | Receiver ID | 00h | **20h** | 00h | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 14 | Focus Far at Camera 1 | Command | FFh | Receiver ID | 40h | **80h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.) | | | | | | |
| 15 | Focus Near at Camera 1 | Command | FFh | Receiver ID | 41h | **00h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1.) | | | | | | |
| 16 | Focus Near (Increments IR Focus closer) at camera 2 | Command | FFh | Receiver ID | 01h | **00h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 17 | Focus Far (Increments IR Focus farther) at camera 2 | Command | FFh | Receiver ID | 00h | **80h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 18 | Set Preset | Command | FFh | Receiver ID | 00h | **03h** | 00h | **P_ID** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P_ID=00~7Fh,The Receiver Stores Current Pan, Tilt, Zoom, Focus Position of Camera 1 in EEPROM. | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 19 | Clear Preset | Command | FFh | Receiver ID | 00h | **05h** | 00h | **P_ID** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P_ID=00~7Fh,The Receiver Clears Current Pan, Tilt, Zoom, Focus Position of Camera 1 in EEPROM. | | | | | | |
| 20 | Goto Preset Position | Command | FFh | Receiver ID | 00h | **07h** | 00h | **P_ID** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, P_ID=00~7Fh, The Pan, Tilt, Zoom & Focus Position of Camera 1 Will be Moved to Stored Preset Position. | | | | | | |
| 21 | Turn on Wiper at Camera 1 | Command | FFh | Receiver ID | 40h | **09h** | 00h | **09h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 09h of Byte 6=Wiper of Camera 1. Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1 and The Wiper of Camera 1 Will be Driven for Several Seconds) | | | | | | |
| 22 | Turn off Wiper at Camera 1 | Command | FFh | Receiver ID | 40h | **0Bh** | 00h | **09h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 09h of Byte 6=Wiper of Camera 1. Camera 1 is DAY/NIGHT Camera with Lens (Set Bit 6 of Byte3 to Select Camera 1 and The Wiper of Camera 1 Will be stopped.) | | | | | | |
| 23 | Turn on Pump | Command | FFh | Receiver ID | 00h | **09h** | 00h | **0Ah** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 0Ah of Byte 6=Pump.The Pump Will be Driven for Several Seconds. | | | | | | |
| 24 | Turn off Pump | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **0Ah** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 0Ah of Byte 6=Pump. The Pump Will be stopped. | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 25 | Turn on Wiper at Camera 2 | Command | FFh | Receiver ID | 00h | **09h** | 00h | **0Bh** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 0Bh of Byte 6=Wiper of Camera 2. Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2 and The Wiper of Camera 2 Will be Driven for Several Seconds.) | | | | | | |
| 26 | Turn off Wiper at Camera 2 | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **0Bh** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, 0Bh of Byte 6=Wiper of Camera 2.Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2 and The Wiper of Camera 2 Will be stopped.) | | | | | | |
| 27 | Toggle Polarity | Command | FFh | Receiver ID | 00h | **09h** | 00h | **01h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 28 | Toggle auto span/Histogram Linear | Command | FFh | Receiver ID | 00h | **09h** | 00h | **02h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2) | | | | | | |
| 29 | NUC on the internal shutter | Command | FFh | Receiver ID | 00h | **09h** | 00h | **03h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 30 | Menu selection one position down | Command | FFh | Receiver ID | 00h | **09h** | 00h | **04h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 31 | Menu selection left pressed | Command | FFh | Receiver ID | 00h | **09h** | 00h | **05h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 32 | Menu selection Right pressed | Command | FFh | Receiver ID | 00h | **09h** | 00h | **06h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 33 | Show menu/accept | Command | FFh | Receiver ID | 00h | **09h** | 00h | **07h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 34 | Power state on | Command | FFh | Receiver ID | 00h | **09h** | 00h | **08h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 35 | Toggle palette | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **01h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 36 | Toggle sensitivity | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **02h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 37 | Toggle e-zoom | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **03h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 38 | One position up | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **04h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 39 | Move menu selection left released | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **05h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 40 | Move menu selection Right released | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **06h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 41 | menu selection cancel/exit | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **07h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |
| 42 | Power state sleep | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **08h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera(Clear Bit 6 of Byte3 to Select Camera 2.) | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 43 | AGC auto/on/ off | Command | FFh | Receiver ID | 00h | **2Fh** | 00h | **00~02h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Byte 6 = 1 (It will set to continuous auto adjust),Byte6=2 (It will set to manual adjust) | | | | | | |
| 44 | Set shutter speed | Command | FFh | Receiver ID | 00h | **37h** | 00h | **00~02h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh,Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Select sensitivity in Byte 6.[0 – low,1 – medium,2 - high] | | | | | | |
| 45 | Adjust white balance( R-B) | Command | FFh | Receiver ID | 00~01h | **3Bh** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) NUC using the internal shutter. | | | | | | |
| 46 | Adjust white balance( M-G) | Command | FFh | Receiver ID | 00~01h | **3Dh** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) NUC using an external surface. | | | | | | |
| 47 | Adjust gain | Command | FFh | Receiver ID | 00~01h | **3Fh** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Set absolute gain. | | | | | | |
| 48 | Adjust auto iris level | Command | FFh | Receiver ID | 00~01h | **41h** | 00h | 00h | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) Set absolute level. | | | | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 49 | Camera Power on at camera 2 | Command | FFh | Receiver ID | 00h | **09h** | 00h | **0Ch** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) DC 12V IR power supply of Thermal camera Will be electrically Turned On by EV3000-D Receiver Without any command sending to thermal camera (default state).But DC12V Defroster supply will always be turned on state. | | | | | | |
| 50 | Camera Power off at camera 2 | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **0Ch** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Camera 2 is Thermal Camera (Clear Bit 6 of Byte3 to Select Camera 2.) DC 12V IR power supply of Thermal camera Will be electrically Turned Off by EV3000-D Receiver without any command sending to thermal camera. But DC12V Defroster supply will always be turned on state. | | | | | | |
| 51 | Initialize PAN/TILT | Command | FFh | Receiver ID | 00h | **0Fh** | 00h | **00h** | Checksum |
| | | EV3000-D Response | None | | | | | | |
| | | Description | Receiver ID=00h~FEh, Pan/Tilt will go to Preset position No."0" which is stored in EEPROM of EV3000-D receiver when manufactured in factory. | | | | | | |

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## 2.Command List for Thermal camera (Basic format is PELCO-D) :

### Internal Communication Commands between EV3000-D Receiver and Thermal camera(4-Bytes command response)

| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Toggle Polarity | Command | FFh | Receiver ID | 00h | **09h** | 00h | **01h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 2 | Toggle auto span/Histogram Linear | Command | FFh | Receiver ID | 00h | **09h** | 00h | **02h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 3 | NUC on the internal shutter | Command | FFh | Receiver ID | 00h | **09h** | 00h | **03h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 4 | Menu selection one position down | Command | FFh | Receiver ID | 00h | **09h** | 00h | **04h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 5 | Menu selection left pressed | Command | FFh | Receiver ID | 00h | **09h** | 00h | **05h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 6 | Menu selection Right pressed | Command | FFh | Receiver ID | 00h | **09h** | 00h | **06h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 7 | Show menu/accept | Command | FFh | Receiver ID | 00h | **09h** | 00h | **07h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 8 | Power state on | Command | FFh | Receiver ID | 00h | **09h** | 00h | **08h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 9 | Toggle palette | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **01h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 10 | Toggle sensitivity | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **02h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 00h | 0Eh | | | |
| 11 | Toggle e-zoom | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **03h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 12 | One position up | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **04h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 13 | Move menu selection left released | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **05h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 14 | Move menu selection Right released | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **06h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 00h | 12h | | | |
| 15 | menu selection cancel/exit | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **07h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 16 | Power state sleep | Command | FFh | Receiver ID | 00h | **0Bh** | 00h | **08h** | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 17 | Narrow field of view | Command | FFh | Receiver ID | 00h | **20h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 18 | Wide field of view | Command | FFh | Receiver ID | 00h | **40h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 19 | Focus Near (Increments IR Focus closer) | Command | FFh | Receiver ID | 01h | **00h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 20 | Focus Far (Icrements IR Focus farther) | Command | FFh | Receiver ID | 00h | **80h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 21 | AGC auto/on/off | Command | FFh | Receiver ID | 00h | **2Fh** | 00h | 00~02h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 22 | Set shutter speed | Command | FFh | Receiver ID | 00h | **37h** | 00h | 00~02h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 23 | Adjust white balance(R-B) | Command | FFh | Receiver ID | 00~01h | **3Bh** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |

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| No | Command | | Byte1 | Byte2 | Byte3 | Byte4 | Byte5 | Byte6 | Byte7 |
|---|---|---|---|---|---|---|---|---|---|
| 24 | Adjust white balance(M-G) | Command | FFh | Receiver ID | 00~01h | **3Dh** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 25 | Adjust gain | Command | FFh | Receiver ID | 00~01h | **3Fh** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |
| 26 | Adjust auto iris level | Command | FFh | Receiver ID | 00~01h | **41h** | 00h | 00h | Checksum |
| | | Thermal camera Response | FFh | Receiver ID | 18h | B9h | | | |

[Note for Byte 2]

Byte 2 is EV3000-D receiver address which can be adjusted from "0~254".

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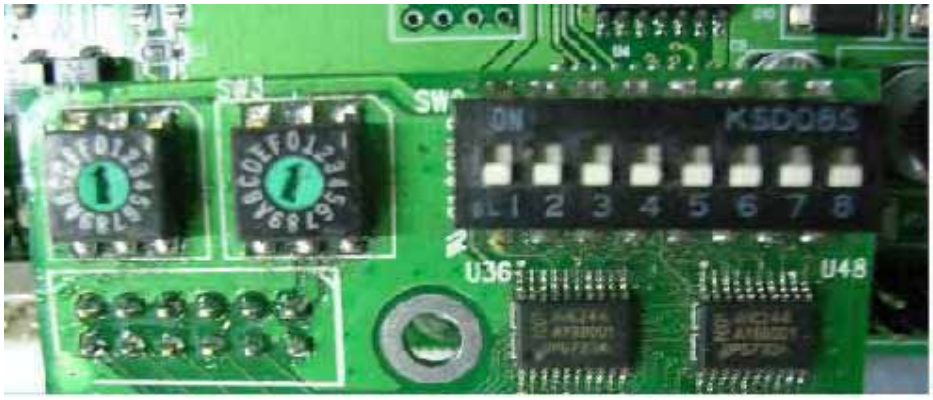
# 8. EV3000-D Address & Baud rate Setting




A) Baud rate Setting

- Set the Switch No.1 & No.2 of 8 POLE DIP Switch as bellows**.**

| Baud rate | Switch No1 | Switch No2 |
|---|---|---|
| 2400 BPS | OFF | OFF |
| 4800 BPS | ON | OFF |
| 9600 BPS | ON | ON |

- **Default: 2400 BPS**

B) Receiver Address Setting

- Set the SW3 and SW4 Hex-decimal Switches as bellows**.**

LSB SIDE (SW3): NO. 0 TO NO.15, MSB SIDE (SW4): NO. 16 TO NO. 255.

| Receiver address (Decimal number) | Sw4(Hexadecimal switch) MSB of hex-decimal Number | Sw3(Hexadecimal switch) LSB of hex-decimal Number |
|---|---|---|
| 15 | "0" POSITION | "F" POSITION |
| 28 | "1" POSITION | "C" POSITION |
| 100 | "6" POSITION | "4" POSITION |

- **Default Address: Set to "1" at factory.**

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# 9. WARRANTY

- Product Warranty

| | | |
|---|---|---|
| MODEL No. | | EV3000-D |
| SERIAL No. | | |
| Date of purchased | | |
| Place of Purchased | | |
| customer | name | |
| | address | |

If the product breaks down during proper use, it will be repaired within 1 year from the date of purchase free of charge

Please contact us:

Tel. (413)592-8477

E-mail: tech@unitedvisionsolutions.com

Http://www.unitedvisionsolutions.com

Address: 10 Center st., Suite 401 & 402, Chicopee, MA 01013 USA

(Pleas refer to our web-site)

| date | Detail | Agency | Repairman |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

Design and specifications are subject to change without notice for improving quality.

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# Appendix A Care and Handling of EV3000-D

### A.1 Cleaning Optics

Follow the lens cleaning instructions below.

a. Examine lens surfaces carefully.

**NOTE: Removal of the thin film coating will seriously degrade optical performance. A change in apparent color indicates the loss of coating.**

- Remove all dust and debris with a soft bristle brush.
- Gently wipe the surface with a single stroke using pads moistened with a 50/50 mixture of isopropyl alcohol and acetone.

**CAUTION: DO NOT rub lens hard!**

d. Drag lightly across surface just fast enough for the liquid to evaporate behind the moving pad. Refer to the figure on the next page.

This should leave no streaks.

**CAUTION: DO NOT clean the lens in a circular motion!**

Follow above procedure with dust cloth to remove any remaining dust.

### A.2 Other External Surfaces

Clean as required with nonabrasive household cleaner.

### A.3 Handling

Use care to ensure that the EV3000-D is not excessively bumped or dropped. Even though the EV3000-D is a rugged instrument, it should be treated very carefully like any other sophisticated camera.

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# Appendix B

## Glossary

**Atmospheric Attenuation** – The amount of radiated IR energy that is absorbed by the atmosphere. It is a function of the temperature and humidity, particles in the air (i.e. fog, smoke, smog, etc.) and wavelength, among other factors.

**CCIR -** Video standard for monochrome, 50 field/sec interlaced video output (i.e. European standard black and white video).

**Critical Dimension –** The dimension of a target used in calculating the DRI performance. It is a function of length, width and height, as well as what face of the target is presented to the imager.

**DRI (Detection-Recognition-Identification)** – A method of characterizing the range performance of a thermal imager according to a standard set of criteria using a standard atmospheric model, and a target of alternating black and white stripe (cycles) at different temperatures.

**Detection –** The minimum distance at which an imager can reproduce a single cycle (black/white stripe) of a target. Typically used to represent the distance at which the imager can first detect a given target (i.e. a hot blob). In addition to the imager, the detection range is also a function of the target size and temperature difference from the background.

**Field of View (FOV)** – The area in space that is seen by the lens of a thermal imager. Usually expressed in degrees, and specified for both horizontal and vertical dimensions. The FOV is a characteristic of the lens.

**FLIR 92** – A set of standards defined by the Night Vision Laboratories for calculating DRI information.

**F-Number** – Focal Length/Diameter of Lens (same as in a visible lens). A lower F-number means that more IR radiation passes through, but the lens is larger.

**Focal Plane Array (FPA)** – An integrated circuit with a two dimensional matrix of detector elements that sits in the focal plane of the thermal imager. An imager that uses an FPA is referred to as a "staring" imager because the entire array stares at the scene to collect IR energy to make an image.

**Hyperfocal Distance** – The distance beyond which all objects are in focus when an imagers' focus adjust is set to infinity.

**Infrared Imager** – An Instrument that collects infrared energy and produces a video image where the gray scale values correspond to differences in temperature.

**Indium Antimonide (InSB)** – Semiconductor material used in the fabrication of a cooled FPA. Typically pronounced "Inns-Bee", these detectors must be cooled to 77°K to operate.

**Identification –** The distance at which an imager can resolve six cycles across a given target. Used to describe the distance at which a target can be clearly identified (in the case of a truck, the ability to discriminate between a T-72 and a Humvee). In addition to the imager, the recognition range is also a function of the target size and temperature difference from the background.

**Infrared (IR) –** The portion of the electromagnetic spectrum located just above visible light. The infrared spectrum extends from just above red (0.7 micron) to about 12 micron.

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**Instantaneous Field of View (IFOV)** - A measure of the spatial resolution of an IR detector. It is defined as the angle seen by an individual pixel in the FPA and is measured in milliradians.

**Kelvin Temperature Scale** - Absolute temperature scale related to the Celsius (or Centigrade) scale. 0° Kelvin (absolute zero) is equal to -273° C. The units of Kelvin are equal to Centigrade degrees. Therefore, room temperature (23°C) is equal to 296° K.

**Long Wave Infra Red (LWIR)** - The section of the infrared band from 7 microns to 12 microns.

**Micro-Cooler** - A miniature Sterling Cycle cooler used to provide cryogenic temperatures for the Focal Plane Array.

**Micron –** One millionth of a meter (10-6 m); Micron units are used to express the wavelength of light.

**Milliradian (mr) –** A measure of angle equal to one thousandth of a radian (1 radian = 180°/pi). Typically used to express the IFOV of an imager (1 mr = 0.0573°).

**Mid Wave Infra Red (MWIR) –** The portion of the infrared spectrum from 3 to 5 microns.

**Minimum Resolvable Temperature Difference (MRTD) –** A figure of merit for a particular FPA based imager, it defines the minimum temperature difference that can be resolved by the detector.

**Narcissus Reflection** - The reflection back into the image of the cooled detector. Because the detector is cooled to cryogenic temperatures, it will reflect back as an intense spot in the center of the image (black spot in white-hot mode).

**Narrow Field of View (NFOV)** – In a dual field of view lens, the NFOV is the smaller of the two fields (more magnification) and is used for identification, recognition and detection at longer ranges.

**Noise Equivalent Temperature Difference (NETD) –** A figure of merit for an FPA based imager, it defines the temperature difference that produces a signal just equal to the RMS noise signal.

**Non-Uniformity Correction** – A built in correction routine that calculates a set of field correction coefficients to apply to each pixel in the array to normalize their response for a given scene temperature.

**NTSC –** Video standard for color, 60 field/sec interlaced video output (i.e.

**US standard color video). PAL** - Video standard for color, 50 field/sec interlaced video output (i.e. European standard color video).

**Pixel –** Abbreviation for Picture Element, or each individual element that comprises a picture. Typical FPA's are arrays of 640 x 480, 320 x 480, or 256 x 256 pixels.

**Radian –** The angular measurement equal to the ratio of the arc length of a circle divided by the radius. A circumference of a complete circle is 2 pi times the radius, so a complete circle (360°) equal 2 pi radians, and pi radians = 180°. 1 radian = 57.3°.

**Recognition –** The distance at which an imager can resolve three cycles across a given target. Typically used to define the distance at which an imager can distinguish between a specific object in a group of similar objects. In addition to the imager, the recognition range is also a function of the target size and temperature difference from the background.

**RS170 –** Video standard for monochrome, 60 field/sec interlaced video output (i.e. US standard black and white video).

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**RS232 -** Serial communication standard using two wires – transmit and receive – and a common ground. Used for relatively short (<10 meter) cable runs.

**RS422 –** Serial communication standard using four wires – a transmit differential pair and a receive differential pair. For use where transmission cable runs go beyond ten meters.

**Short Wave Infra Red (SWIR)-** The portion of the infrared spectrum from 0.70 microns to 3 microns.

**Wide Field of View (WFOV) –** In a dual field of view lens, the WFOV is the wider of the two fields (less magnification) and is used for scanning a broader area at reduced resolution.

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